THE IRON TRADE REVIEW

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Election Results Calmly Accepted By Trade

And Decrease in Activity Not Expected—Remarkable Records for Production Made in October—Large Tonnages of Ore Reserved

October was a wonderful month for production of iron and steel materials. The output of steel ingots was between 2,900,000 and 3,000,000 tons, while the highest previous record was in May of this year, when the production was about 2,600,000 tons. The ingot output of the Steel Corporation exceeded 1,500,000 tons last month. October also broke all records for production of pig iron, the output of coke and anthracite pig being 2,683,672 tons, or 970 tons more than the output of the previous record month, December, 1909. For the third time in the history of the iron trade of the country, more than 2,600,000 tons of pig iron were made in one month. There was a gain of 18 in the active blast furnaces. The output for the ten months of 1912 exceeds the entire production for the year 1911 by 710,085 tons. Last month was the greatest October in the history of the lake trade for the movement of iron ore. The shipments amounted to 7,010,219 tons, making the total movement to Nov. 1, 43,348,601 tons. The total lake movement this year will amount to more than 48,000,000 tons, and, with the addition of the all-rail shipments, the grand total for the year will be very close to 50,000,000 cars.

On Sound Basis

Efforts recently made by leading steel makers to ascertain the extent of speculative buying during the recent movement have developed that there has been very little dealing of this kind, in striking contrast with some other years. This is particularly true of the fabricating and merchant trade, in which the buying movement came so fast that buyers did not have the opportunity to accumulate speculative tonnages. Stocks in the Chicago district are the lowest in three years, and this condition is believed to be true, to a large extent, throughout the country.

Finished Material

Manufacturers of finished material accept the results of the presidential election with confidence that there is no immediate fear of a reversal of business conditions. While some revision of the tariff will probably come in time, it is believed that prosperity is assured for at least a year, and probably for a much longer period. The early great activity of the present buying movement was not due to railroad buying, and railroads did not enter the market freely until other important interests had placed orders for large tonnages. Of the October business booked by the Steel Corporation, only 20 per cent represented direct railroad purchases. Buying by large consumers of finished material for third and fourth quarter continues, but it is by no means general, because sellers are not willing to take business beyond the first quarter of next year, excepting very desirable tonnages of the largest buyers. The unfilled tonnage of the Steel Corporation for October will show an increase of approximately half a million tons.

Pig Iron

Politics has had little, if any, effect on the pig iron market. Buying of pig at Philadelphia and Pittsburgh immediately preceding the election was heavy. In the Pittsburgh district, from 30,000 to 35,000 tons were sold at higher prices than had been prevailing. In some other sections, the market is quiet, but nowhere can the effect of politics be traced. One eastern Pennsylvania iron manufacturer bought 10,000 tons of standard forge at $17.50, delivered. An additional sale of 8,000 tons of basic was made in the Philadelphia market. In Pittsburgh, the Cambria Steel Co. purchased 30,000 tons of Bessemer and 29,000 tons of basic pig iron for delivery during the next six months at $17 and $16.25, respectively; the Pressed Steel Car Co. purchased 5,000 tons of malleable at $17, valley, and the recent purchase of 40,000 tons of basic by the Standard Steel Car Co. became known.

Iron Ore

While the iron ore market has not opened in the sense that prices have been named, reservations of large tonnages have been made, those of one concern amounting to more than a million tons. Ore sellers are satisfied that an advance of 50 cents could easily be obtained, but are using their influence to postpone the buying movement. Owing to the decline in the percentage of iron in Lake Superior ores during the past few years, it is not unlikely that the guaranteed iron content of the base ore will be lowered before contracts for this season's ore are made. A sale of 45,000 tons of Wabana, Newfoundland, ore has been made to Germany at the highest price ever paid by a consumer in that country. The closing, on Jan. 1, of the American office of a concern which for years has been a leading seller of Spanish ore is significant as showing the fact that the demand for European ores by furnaces in that part of the world is so strong that comparatively small tonnages will be available for sale in the United States.

PITTSBURGH

Heavy Buying of Steel Making Pig Iron

Office of THE IRON TRADE REVIEW, 2148-49 Oliver Bldg., Nov. 5.

Many of the mills in this and the valley districts broke all previous records last month in the production of finished steel products, although figures are not obtainable at this time. Leading manufacturers are more concerned in deliveries than in new orders, and many interests have withdrawn from the market.

Despite the presidential election of today, melters of pig iron in this territory have been buying heavily the last four or five days. The Cambria Steel Co. has closed for 59,000 tons of steel-making iron for shipment the next six months, and several other interests have bought heavy tonnages. Foundry, malleable and Bessemer grades are established firmly at $17, valley, and basic is selling at $16.25, valley.

The coke market has been rather quiet, but prices are firm. Several grades of iron and steel scrap have sold at lower quotations this week, not due to any particular weakness, but rather to the fact that consumers are well covered for present and future needs.

Some of the smaller independent mills are enjoying fancy prices for prompt steel plates and structural shapes, and iron bars are bringing $1 above the prevailing quotations for prompt delivery.

Pig Iron.—Heavy sales of steel-making iron have been made the last few days. Most important of the purchases is that of the Cambria Steel Co., Johnstown, Pa., which closed negotiations late this afternoon for 30,000 tons of Bessemer and 29,000 tons of standard basic for shipment the next six months. Although officials of the company do not announce the price at which this iron was obtained, it is generally understood the Bessemer involved was purchased at $17 and the basic at $16.25, valley furnace. This purchase closely follows a much heavier one, two or three weeks ago, by the Cambria company. More than 500,000 tons of steel-making iron have been obtained by the Youngstown Sheet & Tube Co., the Republic Iron & Steel Co., the Jones & Laughlin Steel Co., the Cambria Steel Co. and the Pittsburgh Steel Co. since the 1913 buying movement began about two and a half months ago. Some of this iron will be shipped this year, some the first quarter and a part the second quarter of next year. It is understood several of these interests plan to supplement recent purchases.

The N. & G. Taylor Co., Philadelphia, has been buying small lots of prompt Bessemer, at $17, valley, and an Altoona rolling mill has closed for 2,000 tons of first half gray forge iron. One of the large local casting interests has closed for a round tonnage of first half Bessemer and foundry. The Pressed Steel Car Co. has closed negotiations for about 5,000 tons of malleable at $17, valley, to be melted at the McKees Rocks works. The Standard Steel Car Co., some time ago, closed for about 40,000 tons of basic. This transaction was not announced until this week.

Foundry interests have been buying heavily, and it is not believed that $17, valley, can be shaded. Furnace operators are being urged for shipments, and nearly all the foundry iron consumers are asking additional tonnages. A half dozen or more mine car and car wheel interests have closed transactions this week. We quote all grades of pig iron, for shipment the remainder of this year and first quarter, as follows:

(Remainder of Year and First Quarter.)	
Bessemer, valley	$17.00
Bessemer, Pittsburgh	17.90
Basic, valley	16.25
Basic, Pittsburgh	17.15
No. 2 foundry, valley	17.00
No. 2 foundry, Pittsburgh	17.90
Gray forge, valley	16.00
Gray forge, Pittsburgh	16.90
Malleable, valley	17.00
Malleable, Pittsburgh	17.90

Ferro-Alloys.—Interest is taken in an inquiry for 8,000 tons of 50 per cent ferro-silicon for shipment after Jan. 1 and for 8,000 tons of ferro-chromium and about 1,500 tons of aluminum. This inquiry was put out about the first of the week by one of the heaviest consumers in the district. Several days ago a Mahoning valley consumer closed for 350 tons of ferro-manganese for November shipment, at $73, Philadelphia, which is $2 below the prevailing maximum quotation. Several sellers of low-grade ferro-silicon this week, advanced quotations one dollar per ton, making 12 to 13 per cent $26, furnace, 11 to 12 per cent $25, 10 to 11 per cent $24, and 9 to 10 per cent, $23, furnace. These quotations, however, have not as yet become general. As a general rule, agents in this city are declining to sell beyond Jan. 1, and some of them have been directed to consult foreign offices before entering into transactions of any kind. The war in southern Europe is causing some anxiety, both on the part of consumers who have closed for next year's requirements, and those who have failed to do so.

We quote 80 per cent ferro manganese at $70 to $75, Baltimore, for prompt delivery and $61 for forward shipment. The freight rate from Baltimore to Pittsburgh is $1.95 per ton.

Fifty per cent ferro-silicon is quoted at $75, Pittsburgh, for prompt and forward delivery; 12 to 13 per cent, $25 to $26, 11 to 12 per cent, $24 to $25; 10 to 11 per cent, $23 to $24; 9 to 10 per cent, $22 to $23, f. o. b. Globe, Jisco and Ashland furnaces. The freight rate to Pittsburgh is $1.90. The foreign grades are held at $1 or more a ton over domestic prices.

On ferro-titanium we quote 8 cents per pound for carload lots; 10 cents per pound for 2,000 pound lots and over, and 12½ cents per pound in lots up to 2,000 pounds.

Plates.—Several of the independent mills are selling plates for prompt shipment at from 1.60c to 1.80c, and as high as 1.90c and 2c has been obtained in several instances. Plates for forward delivery are quoted at from 1.45c to 1.50c, although the latter quotation represents the price at which the bulk of the tonnage is going. The latter part of last week, the Pennsylvania Lines West placed the following car order: 1,000 box and 1,000 steel hopper cars with the Pressed Steel Car Co.; 600 box with the American Car & Foundry Co.; and 600 box with the Standard Steel Car Co. This is in addition to an order of 5,000 cars placed by the lines east about 10 days ago. The Pressed Steel Co. has taken an order for 500 general service cars and 200 ore cars for the Northern Pacific. New York Central interests are in the market for 10,000 cars, the Norfolk & Western 5,000 cars, the Chesapeake & Ohio 4,000, and the Chicago, Milwaukee & St. Paul for 3,000 underframes. Quota-

tions for both prompt and forward shipment are as follows:

Standard steel plates ¼ inch thick, 6¼ to 100 inches, 1.45c to 1.50c for shipment after Jan. 1 and 1.60c to 1.80c for prompt shipment. For extras, see card of Sept. 1, 1909.

Sheets.—Leading manufacturers of sheets in this district report that heaviest consumers have covered requirements for the first half of next year and several sales for third quarter shipment are noted. Last month was a record-breaking one in many respects, although official figures are not yet obtainable. A few of the mills are quoting No. 28 gage galvanized sheets at $3.45, No. 28 gage black sheets at $2.25 and No. 10 gage blue annealed sheets at $1.65. It is reported that some prompt tonnage is going at $2 per ton above these quotations. The following quotations prevail for first and second quarter shipments.

Flat Sheets.

Black Sheets.—Nos. 10-12 gage, $1.90 per 100 pounds; Nos. 13-14 gage, $1.95; Nos. 15-16 gage, $2.00; Nos. 17-21 gage, $2.05; Nos. 22-24 gage, $2.10; Nos. 25-26 gage, $2.15; No. 27 gage, $2.20; No. 28 gage $2.25; No. 29 gage, $2.30; No. 30 gage, $2.40.

Tin mill sizes Nos. 15-16 gage, $2.00 per 100 pounds; Nos. 17-21 gage, $2.05; Nos. 22-24 gage, $2.10; Nos. 25-27 gage, $2.15; No. 28 gage, $2.20; Nos. 29-30 gage, $2.25; Nos. 30½-31 gage, $2.30; No. 32 gage, $2.35.

Blue Annealed.—Nos. 3-8, $1.60 per 100 pounds; Nos. 9-10, $1.65; Nos. 11-12, $1.70; Nos. 13-14, $1.75; Nos. 15-16, $1.85.

Galvanized.

Nos. 10-11 gage, $2.40 per 100 pounds; Nos. 12-14 gage, $2.50; Nos. 15-16 gage, $2.65; Nos. 17-21 gage, $2.80; Nos. 22-24 gage, $2.95; Nos. 25-26 gage, $3.10; No. 27 gage, $3.25; No. 28 gage, $3.40; No. 29 gage, $3.55; No. 30 gage, $3.70.

Roofing Sheets

Net extras on all gages per 100 pounds. Corrugated 2-inch, 2½-inch, 3-inch and 5-inch corrugation, 5c; 2 V crimped without sticks, 5c; corrugated 1¼-inch corrugation, 10c; 3 V crimped without sticks, 10c; pressed standing seam with cleats, 15c; plain roll roofing with or without cleats, 15c.

Painted Roofing.

12 to 18 gage, inc., 5c; 19 to 24 gage, inc., 10c; 25 to 28 gage inc., 15c.

Tin Plate.—Although official figures have not been announced, mills report that last month was one of the best so far as new orders were concerned. Consumers in all parts of the country have been placing heavy tonnages for shipment next year and in some cases can factories have covered requirements through the third quarter. From present indications, 1913 will equal, if not surpass, 1912—a record-breaking year. One of the independent mills announced that it was quoting $3.70 on small tonnages for either prompt or forward delivery. This figure, however, is considered a premium rather than a market price. The following quotations are being maintained firmly:

Coke tin plate, 100-pound basis, 14 x 20, $3.60, f. o. b. mill, Pittsburgh district.

Rails and Track Material.—The eastern railroads have covered requirements for 1913 and some of the less important interests have placed orders for rails with mills in this district. The Cambria Steel Co., Johnstown, Pa., has been taking heavy tonnage for next year's shipments. Some of the mills already have enough tonnage on their books to necessitate maximum operations through the first half of the year. Mill officials are busy working on specifications. Standard spikes are quoted from $1.80 to $1.90 and some sellers are refusing to shade the maximum quotation. All of the spike makers have booked heavy tonnages for 1913 shipment. Track bolts are being quoted at 2.25c, the 2.10c quotation having been withdrawn the latter part of last week. Rails are quoted as follows, with the base price on open-hearth standard sections at 1.34c per pound at the mill:

Fifty-pound and heavier, 1.25c per pound; carloads and less than 500 tons, 1.34c per pound; light rails on base weight of 40 to 45 pounds, 1.25c, the schedule on the other weights being irregular and subject to negotiations; angle bars for standard sections, 1.50c, Pittsburgh; track bolts, 2.25c, Pittsburgh.

Railroad Spikes.

4½, 5 and 5½ and 9-16	$1.80 to $1.90
3, 3½, 4, 4½ and 5 x ½	.10
3½, 4 and 4½ x 7-16	.20
3, 3½, 4 and 4½ x ⅜	.30
2½ x ⅜	.40
2½, 3 and 3½ x 5-16	.60
2 x 5-16	.80

Billets and Sheet Bars.—No sales of semi-finished steel products have been reported for several days, although several consumers are in the market. None of the leading factors in the market has sold tonnage for first quarter shipment. Consumers who have not already covered requirements beyond Jan. 1 are confronting a serious situation. The following quotations are nominal to a certain extent, but they represent the market as accurately as possible.

Bessemer 4 x 4 billets with 0.25 carbon and less are quoted at $26.50 to $27.00, with the usual extra for size and analysis, and open-hearth rolling billets, $27.00 to $27.50. Bessemer sheet and tin bars are quoted at $27.50 to $28.00 and open-hearth sheet bars are quoted $28.00 to $28.50, f. o. b. Pittsburgh and Youngstown, with full freight to destination added. Forging billets are quoted at $33.00 to $34.00, Pittsburgh.

Hoops and Bands.—Bands continue to be quoted at 1.40c, and hoops at 1.50c. Announcement that eastern Pennsylvania and Ohio promoters have organized to build a plant at Alton, Ill., was made several days ago. Quotations follow:

Hoops in carload lots, 1.50c; Pittsburgh; in less than carload lots, 1.55c; bands 1.40c to 1.45c, base, with net extras, as per standard steel.

Merchant Bars.—Some of the mills are refusing to take additional orders for steel bars, being unable to promise material before the second quarter. Some of the manufacturers are unable to promise material until after July 1. Iron bars are now being quoted at 1.65c to 1.75c for forward delivery and from 1.70c to 1.75c for prompt shipment. Shafting is firm on the basis of 60 per cent, for carload lots and 55 per cent for less than carload lots, and an advance of $2 a ton before the first of the year is expected. The following quotations prevail:

Common iron bars, 1.65c to 1.70c forward, 1.70c to 1.75c prompt, Pittsburgh; Bessemer and open-hearth steel bars, 1.40c to 1.45c; plow and cultivator, 1.40c to 1.45c; channels, angles, zees, tees, under 3 inch, 1.50c to 1.55c, all f. o. b. mill. The following differentials are maintained on steel: Less than 2 000 pounds and not less than 1,000 pounds of a size, 0.15 advance, less than 1,000 pounds of a size, 0.35. Cold rolled and ground shafting, 60 per cent off in carloads and 55 per cent in less than carloads delivered in base territory.

Muck Bar.—No change is noted in the muck bar market. Heaviest consumers have covered requirements beyond the end of the year, and but little new inquiry is reported. We quote muck bar at $32, Pittsburgh.

Rivets, Nuts and Bolts.—Button head structural rivets and cone head boiler rivets continue to be quoted at 2c and 2.10c, respectively, and as far as can be learned, these quotations are maintained firmly. Demand continues heavy and shipments are more and more deferred each week. On tonnage for delivery after Jan. 1, makers are asking five per cent above the following quotations:

Rivets

Button head structural rivets, 2c; cone head boiler rivets, 2.10c.

Bolt and Nut Discounts

Carriage bolts, ⅜ x 6 inches, smaller and shorter, rolled threads, 75, 10 and 2½; cut threads, 75 and 7½; larger and longer, 70 and 10.

Machine bolts with hot pressed nuts, ⅜ x 4 inches, smaller and shorter, rolled, 75, 10, 10 and 2½; cut, 75, 10 and 7½; larger and longer, 70, 10 and 5.

Gimlet and cone point lag or coach screws, 80 and 10.

Hot pressed square, blank or tapped nuts, $5.80 off list; hot pressed hexagon blank or tapped, $6.40.

Cold pressed C. & T. square, blank or tapped, $5.80 off; hexagon, blank or tapped, ⅛-inch and larger, $6.70 off; smaller than ⅛-inch, $7.30 off.

Structural Shapes.—Fabricators report that the past week has been quiet as far as new orders are concerned. Several important inquiries are pending and it is probable several awards will be announced this week. Shapes are quoted at 1.45c to 1.50c for forward shipment and at 1.60c for prompt delivery. Consumers report that it is almost impossible to obtain material for anything like prompt delivery. Prices follow:

Standard structural shapes, 1.45c to 1.50c, for shipment after Jan. 1 and 1.60c for

prompt shipment. For extras see card of Sept. 1, 1909.

Merchant Pipe.—Anxious consumers of iron and steel pipe in this district are attempting to obtain all possible tonnage before cold weather makes it impossible to extend pipe line projects. Mills are being urged for shipments and some complaint is heard because of deferred deliveries. The Connecting Gas Co., a subsidiary of the Standard Oil Co., has placed an order for 40 miles of 16-inch pipe for Ohio shipment between the leading interest and one of the independent mills in this district. This inquiry originally called for 75 miles and it is probable the remaining 35 miles will not be placed until next year. An Ohio pipe maker has taken an order for 10 miles of 6-inch pipe. An inquiry for 12 miles of 6-inch pipe for western shipment is still pending. Official discounts to jobbers subject to preferential discount of the large buyer are as follows:

Iron and Steel Pipe Basing Prices.

STEEL.

	Butt.		Lap.	
	Black.	Galv.	Black.	Galv.
⅛, ¼ and ⅜ inch.	72	52	..	..
½ inch	76	66	..	..
¾ to 3 inch	79	71	..	..
2 inch	..	..	76	68
2½ to 6 inch	..	..	78	70
7 inch to 12 inch	..	..	76	66
13 to 15 inch	..	..	53	..
Extra Strong, Plain Ends.				
⅛, ¼ and ⅜ inch.	68	58	..	..
½ inch	73	67	..	..
¾ to 1½ inch	77	71	..	..
2 to 3 inch	78	72	..	..
2 inch	..	..	74	66
2½ to 4 inch	..	..	76	68
4½ to 6 inch	..	..	75	67
7 to 8 inch	..	..	68	58
9 to 12 inch	..	..	63	53
Double Extra Strong Plain Ends.				
½ inch	63	57	..	..
¾ to 1½ inch	66	60	..	..
2 to 2½ inch	68	62	..	..
2 inch	..	..	64	58
2½ to 4 inch	..	..	66	60
4½ to 6 inch	..	..	65	59
7 to 8 inch	..	..	58	48

IRON.

⅜ inch	66	47	..	..
½ inch	70	57	..	..
¾ to 2½ inch	73	62	..	..
2 inch	..	..	69	59
2½ to 6 inch	..	..	71	62
7 to 12 inch	..	..	69	56
Extra Strong Plain Ends, Card Weight.				
⅜ inch	64	53	..	..
½ inch	68	61	..	..
¾ to 1½ inch	72	63	..	..
2 and 2½ inch	73	64	..	..
2 inch	..	..	67	59
2½ to 4 inch	..	..	71	62
4½ to 6 inch	..	..	70	61
7 to 8 inch	..	..	64	54
9 to 12 inch	..	..	59	48
Double Extra Strong Plain Ends, Card Weight.				
½ inch	58	50	..	..
¾ to 1½ inch	61	53	..	..
2 and 2½ inch	63	55	..	..
2 inch	..	..	56	50
2½ to 4 inch	..	..	61	55
4½ to 6 inch	..	..	60	54
7 and 8 inch	..	..	53	43

Plugged and reamed pipe is furnished at 2 points higher price, either butt or lap weld.

The above discounts are for full weight pipe, subject to a variation of 5 per cent, merchant pipe, when specified, being furnished up to 6 inches at one point higher discount (lower price).

Boiler Tubes.—Makers of iron and steel boiler tubes have enough tonnage on their books to keep mills busy the remainder of the year. Demand continues fairly heavy and specifying has been liberal. The following quotations prevail, although some makers are obtaining premiums for prompt shipments.

	Steel.	Iron.
1½ inch	..	..
1¾ to 2¼ inch	62	47
2½ inch	64½	52
2¾ to 3¼ inch	69½	54½
3½ to 4½ inch	72	57
5 and 6 inch	64½	..
7 to 13 inch	62	..

To destination east of Mississippi river will be sold at delivered discount for carloads lowered by 2 points, for lengths 22 feet and under; longer lengths, f. o. b. Pittsburgh. Usual extras to jobbers and boiler manufacturers.

Wire.—Contrary to expectations, only one of the mills in this district has advanced quotations to the $1.75 base for nails. This advance was announced several weeks ago by the Jones & Laughlin Steel Co., which already has booked some tonnage for 1913 shipment at that figure. Other mills, at that time, advised that the new quotations would be adopted, but no changes have been made. That prices will be advanced, however, before books for next year's tonnage are opened is generally believed by the trade. We quote wire products as follows:

Wire nails, jobbers' carload lots, $1.70 to $1.75, retailers' carload lots, $1.75 to $1.80; cut nails (western makers), jobbers' lots, $1.70; painted barb wire, jobbers' carload lots, $1.70 to $1.75; retailers' carload lots, $1.75 to $1.80, with 40c for galvanizing; plain wire to jobbers in carloads, $1.50 to $1.55; and to dealers, in carloads, $1.55 to $1.60; polished staples, $1.70 to $1.75; galvanized staples, $2.10.

Wire Rods.—Several consumers are in the market for wire rods, but no sales have been noted for more than a week. One of the leading independent mills today advised that it would not quote less than $30, Pittsburgh, although no sales above $29 have been made. We continue to quote both Bessemer and open-hearth rods at $29, Pittsburgh.

Coke.—The coke market has been quiet this week and some manufacturers claim this is on account of the approach of the election. It is rumored that spot furnace coke has sold at $4.50, ovens, although such transactions cannot be verified. One of the leading sellers of foundry coke reports that he has sold rather heavy tonnages at $4, ovens, which is 50 cents above the quotation of a week ago. Several inquiries for contract furnace coke are pending, but consumers continue to refuse to pay the $3.50, ovens, quotation asked by makers. In fact, several eastern interests have announced that they will use mountain coke instead of the standard grade because of prevailing quotations. The Connellsville *Courier* for the week ending Oct. 26 says that production made a gain of 256 tons over the week before. Furnace ovens made the larger gain. Shipments made a net increase of 44 cars. Quotations follow:

Connellsville furnace	$3.85 to 4.00
Connellsville furnace contract	2.75
Connellsville foundry	4.25 to 4.50
Connellsville foundry contract	3.50 to 4.00

Old Material.—Heavy melting steel has sold at 50 cents below the maximum quotation of a week ago, and several other grades have displayed some weakness the last few days. This situation is explained in several ways. First of all, consumers bought heavily a few weeks ago when heavy melting steel began to advance, and as a consequence built up large stocks. Dealers have been asked to hold up shipments in many instances and the railroads have placed an embargo against the Carbon Steel Co., this city. Then again, there has been some hesitancy on the part of buyers on account of the election, several advising middlemen that they preferred to wait until after Tuesday, which is an altogether natural and not at all surprising situation. One of the mills bought a round tonnage of good quality heavy melting stock the latter part of last week at $15.75, and a buyer for one of the leading independent mills this afternoon said he believed he could obtain heavy tonnages at as low as $15.50. Bundled sheet scrap has sold 25 cents below the prevailing quotations of a week ago, and No. 1 wrought scrap has developed similar weakness. Machine shop turnings have been obtained at $11.25, which is 25 cents below the minimum quotation of last week, and No. 1 cast scrap has sold at 50 cents less than it was quoted a week ago. Dealers claim that the market has displayed no weakness. They attribute the lower quotations to the fact that dealers are well supplied. Quotations per gross ton for delivery to mills in this district are as follows:

Heavy melting scrap	$15.75 to 16.00
Rerolling rails	16.50 to 17.00
Malleable	14.50 to 15.00
Bundled sheet scrap	13.00 to 13.50
Iron axles	25.00 to 26.00
Old iron rails	16.50 to 16.75
Stove plate	11.00 to 11.50
No. 1 wrought scrap	15.50 to 16.00
Old car wheels	15.75 to 16.25
Low phosphorus	18.50 to 19.00
Machine shop turnings	11.25 to 11.75
Cast borings	10.25 to 10.75
No. 1 cast scrap	14.00 to 14.50

Fire on Nov. 5 badly damaged the Western Maryland Railroad Co.'s round house at Richley, near Cumberland, Md. Five locomotives and considerable machinery were damaged. The loss is estimated at $150,000.

CHICAGO

Mills Flooded With Specifications

Office of THE IRON TRADE REVIEW,
1328 Monadnock Blk., Nov. 5.

The tendency of the market is still toward higher quotations. An advance of $1.00 a ton has been made on track fastenings. Producers in this territory are being flooded with specifications and in rails and track fastenings the total received during October breaks all previous records. Although not on a par with sales, shipments and production are constantly increasing, the last month setting a high mark in this territory, including mills of the Corporation. While some large structural contracts have been taken by fabricators who are well covered for their requirements, the majority consists of small tonnages that can be obtained from store. The eastern independents continue to take the bulk of the new business in bars, plates and shapes, as Chicago producers are out of the market.

Pig Iron.—All shading on northern iron has disappeared and the market is now firm on a basis of $17.50 f. o. b. Chicago. Local furnaces are well sold up and business even at that figure is being discouraged. Spot inquiry for both northern and southern iron is increasing and a very noticeable feature is that many melters are asking deliveries during the remainder of the year on iron contracted for the first half. This, coupled with the fact that buyers are becoming more anxious for prompt delivery, indicates an increasing amount of business and a repetition of previous conditions. Southern iron is hardening to a basis of $14.50, Birmingham, the only quotation below that figure being $14.00 for delivery during the remainder of the year. Two lots consisting of two cars each were sold during the week to Milwaukee melters at $14.50, Birmingham, and an inquiry from a northern Illinois melter for 200 tons for prompt shipment has appeared. Other inquiries aggregate about 2,000 tons and include lots of 500, 1,000 and 300 tons. The J. I. Case Co. has sent out an inquiry for a fair lot of 8 per cent silveries and has refused an offer of $21.40 f. o. b. Chicago.

Although political activities have appeared to have but little effect on the market, it is thought in some quarters that buyers have postponed their purchases until after election and that the ensuing week will bring heavy inquiries.

The following prices represent the market for Chicago delivery except northern foundry and malleable Bessemer, which are quoted f. o. b. local furnaces.

	Rest of year.	First quarter.
Lake Superior Charcoal	$18.75	$19.25
Northern foundry No. 2	17.50	17.50
Southern foundry No. 2	18.35	18.85
South'n Silveries, 5 per cent sil.	19.35	.....
Jackson co. silv'r's 8 per cent.	21.40	21.90
Malleable Bessemer	17.50	17.50
Alabama basic	18.85	.....

Merchant Bars.—Bar iron continues firm at 1.50c to 1.60c, although the bulk of the business is being placed in the neighborhood of the higher quotation. The quantity of hard steel bars that is sold at 1.60c is also small as compared to the tonnage placed at 1.70c. Rerolling rails are still scarce, and the crowded condition of the mills is postponing delivery on bar iron to an even later date. Soft steel bars are firm at the prevailing quotations with an increasing tendency toward a higher level. Representatives of eastern mills are practically the only producers who are able to take business in this territory.

We quote, f. o. b. Chicago, as follows:

Bar iron, 1.50c to 1.55c, hard steel bars, rerolled, 1.60c to 1.70c; soft steel bars, bands and small shapes, 1.63c; hoops, 1.63c; smooth finished machinery steel, 1 inch and larger, 1.78c; shafting 60 per cent off list for carload lots, 55 per cent off for less than carloads.

On iron and steel from local stock, we quote as follows:

Bar iron, 1.95c per pound base; soft steel bars, 1.95c per pound base; soft steel hoops, 2.20c, full extras.

Structural Material.—Although the lettings for the week in the west show some improvement, the larger tonnages were taken by fabricators who are well covered by contracts. As is the case with bar iron, the eastern mills are obtaining almost all of the business for first half delivery that can be placed and the smaller contracts are being filled from store.

Jobbers in this district are expecting no difficulty in meeting deliveries during the first half, as they are well covered for their requirements. While fabricators are obtaining very satisfactory prices for such business as they are able to take, their difficulties in obtaining material are increasing, as are also the number of projects that are being postponed until next year. Structural contracts placed during the week aggregate 12,771 tons, of which the American Bridge Co. has taken 4,784 tons from the Great Northern Railway Co. for bridges across the Missouri and Yellowstone rivers. The same fabricator has also taken 1,600 tons from the Northern Pacific Railway Co. for various bridges. The Modern Steel Structural Co. has taken 1,796 tons from the city of Shreveport, La., for a steel highway bridge across the Red river. The Riverside Bridge Co. has taken 171 tons from the Licking Light & Power Co. for a power station at Newark, O., and the Fort Pitt Bridge Co. has taken 4,215 tons from the Northern Pacific Railway Co. for various bridges. The C., R. I. & P. Railway Co. has let a contract for 205 tons of structural material for a new office building at El Reno, Okla.

We quote, f. o. b. Chicago, as follows:

Beams and channels, 15 inch and under, 1.68c. For extras, see Pittsburgh report.

Store prices are as follows:

All angles, 3 inches and larger, including 6 inches, $2.05 per 100 pounds; angles over 6 inches, $2.15 per 100 pounds, base; beams 3 to 15 inches, inclusive, $2.05 per 100 pounds, base; channels, 3 inches and larger, $2.05 per 100 pounds, base.

Rails and Track Fastenings.—Notwithstanding the fact that all previous records were broken in this district in production, shipments and sales during the month of October, railroad buying is even heavier and specifications for track fastenings have brought about an advance of $1 a ton on both spikes and track bolts. Mills of the Steel Corporation continue to receive the larger part of the orders with some smaller tonnages going to eastern producers. It is the evident intention of the western roads to cover as nearly as possible for their 1913 requirements before the first of the year.

We quote light rails, f. o. b. Chicago:

Light rails, carloads, 25 to 45-pound, 1.30c; 16 to 20-pound, 1.35c; 12-pound, 1.40c; 8-pound, 1.50c.

Light section relayers, 45 pounds and under, subject to inspection, $22 to $24; standard section relaying rails, subject to inspection, 2.30c.

Track fastenings f. o. b., Joliet, are as follows:

Track fastenings, f. o. b. Joliet, angle bars 1.50c; railroad spikes, 1.95c; smaller size spikes, 1.75c base; track bolts with square nuts, 2.25c to 2.30c.

Plates.—It is reported that some of the larger car shops in this territory are filled for a year to come and orders taken at this date cannot be delivered until November, 1913. Car builders are sharing the difficulties experienced by fabricators in obtaining materials and in spite of the crowded condition of their shops, an increasing number of car orders has appeared. The Missouri Pacific is in the market for 2,000 box cars and 2,000 gondolas. The St. Paul, Minneapolis & Sault Ste. Marie is in the market for a number of mail cars, and the Atchison, Topeka & Santa Fe has ordered 25 ore cars from the National Dump Car Co. The Northern Pacific is said to have ordered 1,100 refrigerator cars and 500 gondola cars from the Mt. Vernon Car & Mfg. Co. This item, however, has not been confirmed.

We quote, f. o. b. Chicago, as follows:

Tank plates, ¼ inch thick, 6⅝ to 100 inches wide, 1.68c. For extras, see Pittsburgh report.

Stock prices are as follows:

Tank steel, ¼ inch and heavier, up to 72 inches wide, $2.05.

Bolts, Nuts and Rivets.—The recent advances made on bolts and nuts have caused no cessation of the demand and structural rivets remain firm at 2.08c to 2.18c with the bulk of the business going at the higher quotation. The market for these materials reflects the conditions obtaining in other finished lines and prices are very buoyant with a marked tendency upward.

We quote prices on bolts, nuts and rivets, as follows:

Rivets

Structural rivets, ¾ to 1¼ inches, 2.08c to 2.18c. base, Chicago, in carload lots; boiler rivets, 0.10c additional.

Bolt and Nut Discounts

Carriage bolts up to ⅝ x 6 inches, rolled thread, 75-10-2½; larger sizes, 70-5.

Machine bolts, up to ⅝ x 4 inches, rolled thread, 75-10-7½; cut thread 75-10-2½; larger sizes, 70-10.

Hot pressed nuts, square head, $5.80 off per cwt.; hexagon, $6.40 off per cwt.

Sheets.—A very limited tonnage for second quarter delivery constitutes practically all the sheets that are available in this market. No advance in prices has been made, but producers feel that higher quotations may be forced by the continued high price of spelter. Even higher quotations on the latter material may be brought about by the recent decision of the Standard Oil Co. to withdraw from the market on fuel oil. Smelters who were forced to suspend for lack of natural gas were preparing to use fuel oil in its place and are at a loss for a solution of the problem.

We quote f. o. b. Chicago, as follows:

Blue annealed, No. 10, 2.15c; No. 12, 2.20c. Box annealed, No. 28, 2.70c. Galvanized No. 28, 3.95c.

For mill prices, see Pittsburgh report. Freight to Chicago, 18 cents.

Wire Products.—No advance on wire products has been made in this territory, as the leading interest continues to adhere to $1.88. While some of the independents are having difficulty in making deliveries, the former is still in a position to make fairly prompt shipments. Buying continues at a very good rate, but some distributors are showing an inclination to hold off. This may cause future difficulty, as it is but a question of time until mill capacities are pretty well filled, and it is certain that higher quotations will be in order before long.

We quote f. o. b., Chicago, as follows:

Wire nails, jobbers' carload lots, $1.88; retailers' carload lots, $1.93, retailers' less than carload lots, $1.98; painted barb wire, jobbers' carload lots, $1.88; retailers' carload lots, $1.93; retailers' less than carload lots, $1.98, with 40c for galvanizing; plain wire, jobbers' carload lots, $1.68; retailers' carload lots, $1.73.

Merchant Pipe and Tubes.—Very little change is evident in the market for this material except that prevailing conditions are becoming worse. In spite of strenuous efforts to keep pace with the demand, some makers report that they are further behind on deliveries. Specifications are increasing and prices are very buoyant.

We quote store prices on merchant pipes and tubes, as follows:

Iron and Steel Pipe Basing Prices.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
Butt.				
⅛ inch and ¼ inch.	69.2	48.2	62.2	41.2
⅜ inch	73.2	62.2	67.2	51.2
½ inch to 1½ inch.	76.2	67.2	70.2	58.2
Lap.				
2 inch	73.2	64.2	67.2	57.2
4½ inch to 6 inch.	75.2	66.2	68.2	59.2
Card Weight.				
7 inch to 12 inch...	72.2	61.2	66.2	55.2
Extra Strong Plain Ends.				
Butt.				
⅛, ¼, ⅜ inch.....	64.2	52.2	59.2	47.2
½ inch	69.2	57.2	64.2	52.2
2 inch to 3 inch....	74.2	62.2	....	....
Lap.				
2 inch	70.2	58.2	65.2	53.2
7 inch to 8 inch....	64.2	52.2	59.2	47.2
Double Extra Strong.				
Butt.				
½ inch	57.2	45.2	....	....
¾ inch to 1½ inch	60.2	48.2	....	....
Lap.				
2 inch	58.2	46.2	....	....
4½ inch to 6 inch..	59.2	47.2	....	....
7 inch to 8 inch....	52.2	40.2	....	....

Tubes.

	Lap weld steel.	Charcoal iron.	Shelby seamless.
	Per cent.	Per cent.	Per cent.
1 inch	37	..	55½
1¼ to 2¼ inch.....	53	38	34
2¾ to 3½ inch.....	63	48	44
3½ to 4½ inch.....	65½	48	44
5 to 6 inch.....	53	..	..

Cast Iron Pipe.—Specifications for small tonnages still constitute the bulk of the business, and, although increasing strength of pig iron is having an appreciable effect on cast iron pipe, no advances on the latter have been made. Contracts pending include about 200 tons of water pipe required by Kansas City, Missouri, which will be placed during the week.

We quote f. o. b., Chicago, as follows:

Four-inch water pipe, $30, 6 to 12 inches, $28, larger sizes, $27; gas pipe, $1 a ton higher.

Old Material.—Although no heavy scrap offerings have been made by the railroads, the market continues weaker, and lower prices are quoted on a number of items. Stocks in the hands of consumers are very large and the latter are not disposed to buy at high quotations. The dealers are anxious to unload their stocks, but in most cases are asking higher prices than they are able to obtain. The St. Louis & San Francisco has invited bids on 545 tons of scrap on which quotations were closed Tuesday. The principal item was 75 tons of pipes and flues. The Pennsylvania Lines West has also issued a small list of mixed scrap.

We quote for delivery in consumers' yards, Chicago, as follows:

Gross Tons

Old car wheels	$14.75 to 15.25
Old iron rails	17.00 to 17.50
Rerolling rails (5 ft. and over)	16.25 to 16.75
Old steel rails (3 ft. and und.)	14.50 to 15.00
Frogs, switches and guards	14.25 to 14.75
Heavy melting steel	13.75 to 14.25
Shoveling steel	14.00 to 14.50

Net Tons

No. 1 R. R. wrought	$13.25 to 13.75
No. 2 R. R. wrought	12.25 to 12.75
Arch bars and transoms	17.00 to 17.50
Knuckles, couplers and springs	12.75 to 13.25
Shafting	16.75 to 17.25
Iron car axles	21.50 to 22.00
Steel car axles	18.00 to 18.50
Locomotive tires	13.50 to 14.40
Dealers forge	11.25 to 11.75
Pipe and flues	10.75 to 11.25
No. 1 cast	13.75 to 14.25
No. 1 busheling	11.50 to 12.00
No. 2 busheling	8.50 to 9.00
No. 1 boiler cut	10.00 to 10.50
Boiler punchings	13.00 to 13.50
Cast and mixed boring	8.00 to 8.25
Machine shop turnings	8.75 to 9.25
Railroad malleable	13.75 to 14.25
Agricultural malleable	12.25 to 12.75
Angle bars, splices, etc., iron	16.50 to 17.00
Angle bars steel	12.75 to 13.25
Stove plate and light cast scrap	11.00 to 11.50

Advances Wages.—The E. & G. Brooke Iron Co., Birdsboro, Pa., has advanced the wages of its employes in its puddle mills and nail factory.

CLEVELAND

Heavy Iron Ore Reservations

Office of THE IRON TRADE REVIEW, Penton Bldg., Nov. 5.

Iron Ore.—As was expected, October was the fifth month of the year in which ore shipments exceeded 7,000,000 tons, the October movement being 7,010,219 tons, making the movement for the season to Nov. 1, 43,348,601 tons. This great total exceeds the entire shipment for the record year 1910, when the fleet moved 42,620,201 tons. In November, 1909, the fleet moved 4,899,220 tons, and the outlook is that the movement this month will be in the neighborhood of 5,000,000 tons, making the lake movement for the year about 48,300,000 tons. Adding the all-rail shipments, it is probable that the entire movement will exceed 49,000,000 tons.

The distinction between a reservation and a sale is sometimes a very fine one, and while all ore shippers agree that the market has not been open in the sense that sales have been made at a stated price, reservations are very heavy and some of them are so definite as practically to amount to sales. Ore men are confident that no trouble will be experienced in selling at present at an advance of 50 cents over this year's prices, but if present prosperous conditions continue, the advance may be more than 50 cents. Statistics presented elsewhere in this issue, showing how Lake Superior ores have declined in iron content during the past 10 years and increased in phosphorus content, indicate that the base ore may again be changed by lowering the guarantee on iron content. The demand for vessels is active, and considerable wild tonnage is being carried.

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $3.75; Mesabi Bessemer, $3.50; old range non-Bessemer, $3.00; Mesabi non-Bessemer, $2.85.

Pig Iron.—The pig iron market in the immediate Cleveland district is extremely quiet, and dealers are devoting their energies largely to satisfying their customers on deliveries. Considerable difficulty is being experienced in obtaining cars. For delivery during the remainder of the year and the first half of next year, we quote as follows, delivered Cleveland:

No. 1 foundry	$17.75 to 18.25
No. 2 foundry	17.25 to 17.50
No. 2 southern	17.35
Bessemer	17.90
Lake Superior charcoal	19.10 to 19.75
Silveries, 8 per cent silicon	20.55 to 21.55

Coke.—The scarcity of foundry coke continues and from $4 to $4.25 is being asked on contracts, and $4.65 on spot. Stock coke is sold at about $3.50. Car shortage continues.

Connellsville furnace coke, $3.75 to $4.00 for prompt delivery, and $2.75 to $3.00 on contract; Connellsville foundry coke, $4.00 to $4.65 for prompt, and $4.00 to $4.25 on contract.

Finished Material. — Specifications continue heavy, but new business is rather light. Premiums are being paid for prompt delivery from eastern mills, but the tonnage is not large. Consumers continue to adhere to a conservative policy concerning contracts. The Cambria Steel Co. has taken an order for 50 gondolas and 10 hoppers, all steel, for the Youngstown Sheet & Tube Co. The contract for supplemental piers for the highway bridge has been held up on account of irregularities which have developed. Nut and bolt business is very active and makers are steadily getting farther behind on deliveries. Warehouses are doing a heavy business in all kinds of material.

Old Material.—The scrap market is unusually quiet, the political uncertainty during the past week, having developed what is termed by one dealer as an "election" market. In marked contrast to the activity shown during the past few months, there are few sales being made and the mills are not seeking to buy. Both consumers and dealers have apparently been waiting for the passing of the election. Dealers, however, are shipping heavily on contract. We quote, f. o. b., Cleveland, as follows:

Gross Tons.

Old iron rails	$17.75 to 18.50
Old steel rails (under 6 ft.)	15.00 to 15.50
Old steel rails (over 6 ft.)	16.00 to 16.25
Relaying rails	23.50 to 24.00
Old steel boiler plate	12.25 to 12.75
Malleable iron (railroad)	14.50 to 15.00
Steel axles	19.50 to 20.00
Axle turnings	12.50 to 13.00
Malleable iron (agricultural)	13.00 to 13.50
Heavy steel	14.50 to 15.00
Country mixed steel	13.00 to 13.50
Bundled sheet scrap	11.50 to 12.00

Net Tons.

No. 1 R. R. wrought	$15.00 to 15.50
No. 1 busheling	12.75 to 13.25
No. 1 machine cast	13.25 to 13.75
No. 1 dealers' wrought	11.50 to 12.00
Machine shop turnings	9.00 to 9.25
Pipes and flues	11.50 to 12.00
Wrought drillings	9.00 to 9.25
Cast borings	8.75 to 9.25
Stove plate	10.50 to 11.00
Wrought iron piling plate	16.00 to 16.50
Wrought iron arch bars	17.00 to 17.50

May Take Over Rolling Mill

St. Louis, Nov. 5.—The rolling mill industry in East St. Louis will be revived if efforts of St. Louis and East St. Louis capitalists to organize a $350,000 corporation to take over the East St. Louis plant of the Republic Iron & Steel Co. materialize.

Henry D. Sexton, president of the Southern Illinois National Bank of East St. Louis; Fred Hottes, an East St. Louis merchant; Thomas Cunningham, of East St. Louis, and H. C. Large, of St. Louis, are the persons interested in the new project. Cunningham and Large are superintendent and assistant superintendent, respectively, of the plant. Large and Sexton assert that they believe the plans of the new company will go through.

The plant has been closed since July 1, last. The Republic Iron & Steel Co. had given an order to have it dismantled, but rescinded the order when given tentative assurance that a new company would likely be formed to take over the plant. It formerly employed quite a force of men, with an annual payroll of about $500,000.

Danger of Coal Famine

Chicago, Nov. 5.—There is grave danger of a coal famine in Chicago, which will be even more severe than the shortage last winter. Some steam grades of coal have advanced more than $1.25 per ton. The railroads are blamed for the present situation, coal dealers asserting that an unusual shortage of cars prevents the shipment of coal from the mines. There is no shortage in the production in the Illinois bituminous fields. A coal shortage would severely affect the numerous iron and steel interests in the Chicago district.

CINCINNATI

Lull in Pig Iron Market Continues

Office of THE IRON TRADE REVIEW,
503 Mercantile Library Bldg., Nov. 5.

Pig Iron.—The lull in the pig iron market continues, and there has not been a good buying movement for over a month. Most of the contracts being closed are being made by salesmen who are continually placing small orders without previous inquiries. General inquiries for tonnages larger than 500 tons are scarce, and this, together with the fact that the melters are constantly buying in small lots, indicates that the latter are either waiting until the first of the year to cover for future requirements, or else are unable to get the iron already contracted for as fast as it is needed. This last case is very common, and furnaces in many cases, because of the lack of equipment, coke, labor or ore, are unable to meet the demand on contracts. The market is undoubtedly strong, and the indications are that prices will go higher in order to offset the high prices and the difficulties of securing coke and ore.

Prices in the south have not changed, and there is still furnace iron to be had among the Tennessee producers at $13.50, Birmingham basis, while some of the Alabama stacks are none too firm at $14, for this year's shipment. For the first quarter, very little iron, if any, can be had below $14, Birmingham, and some of the furnaces that are practically out of the market are holding for $14.50, Birmingham, for either last quarter or first quarter delivery. The Tennessee Coal, Iron & Railroad Co. has been offering No. 2 foundry iron for the second quarter at $15, Birmingham, and it has also developed that several Birmingham and Tennessee furnaces have been closing some contracts for shipment this far ahead for some time, but generally on desirable business only. Southern prices, therefore, can be given as follows, Birmingham basis: Tennessee furnaces, $13.50 to $14.50, for spot or this year's shipment; $14 to $14.50 for first and second quarter shipment. Alabama furnaces, $14 to $14.50, for delivery during the rest of the year, and $14 to $15, for the first and second quarters in 1913.

In southern Ohio, while the general tendency has been for some time for prices to advance, they have not done so, and are still given at from $16.50 to $17, Ironton, for deliveries from the present time through the first quarter of next year. Most of the sales in that territory recently have been for malleable and basic iron, but both of these grades are rather scarce at present. A few sales are reported to have been closed at $17, Ironton, which is the minimum price of some of the furnaces, but others are still quoting and accepting business at $16.50.

A large St. Louis melter has recently bought 10,000 tons of basic iron, but very little, if any, was taken by southern Ohio furnaces. There is an inquiry in the market for 1,000 tons of basic iron from Detroit, for shipment over the next three months. With freight rates $3.25 from Birmingham, and $1.20 from Ironton, we quote Cincinnati prices as follows:

Southern foundry No. 1	$17.25 to 18.00
Southern foundry No. 2	16.75 to 17.75
Southern foundry No. 3	16.25 to 16.75
Southern foundry No. 4	16.00 to 16.50
Southern gray forge	15.75 to 16.25
Mottled	15.25 to 15.75
Southern No. 1 soft	17.25 to 18.00
Southern No. 2 soft	16.75 to 17.75
Standard southern car wheel	27.25 to 27.75
Northern No. 2	17.70 to 18.20
Northern No. 3	17.20 to 17.70
Northern No. 4	16.95 to 17.45
Silveries 8 per cent silicon	20.20 to 21.20

Coke.—Prices on spot coke continue to advance, and $4.25 to $4.50 a ton are the lowest quoted on some foundry makes from the Connellsville and Wise county fields. There is little contract coke to be had, as the ovens are selling about all of their output for spot delivery because of the present fancy prices, and this accounts to a certain extent for the handicapping of many users who had depended upon their contracts for their requirements. Pocahontas ovens have practically ceased making coke, and are selling their coal. As their output of coke has been contracted for at comparatively low prices when compared with those at the present time, they can make more profit selling their coal direct. Dealers state that ovens in many of the fields are refusing to give out quotations on contract coke, stating that they have none to sell. The market is wild, and there is no indication of its settling before the first of the year. Sales of small lots are also the rule at present, as not many of the ovens seem willing to dispose of their coke in large quantities. We quote below from the leading coke producing districts as follows:

	Prompt shipment.	Contract.
Connellsville district:		
Foundry coke	$4.00 to 4.75	$3.75 to 4.00
Furnace coke	3.85 to 4.25	3.00 to 3.50
Wise county district:		
Foundry coke	$4.00 to 4.25	$3.75 to 4.00
Furnace coke	3.50 to 4.00	3.25 to 3.75
Pocahontas district:		
Foundry coke	$3.75 to 4.00	$3.25 to 3.75
Furnace coke	3.25 to 3.75	2.75 to 3.00
New River:		
Foundry coke	$3.75 to 4.25	$3.25 to 3.75
Furnace coke	3.25 to 3.75	2.75 to 3.00

Old Material.—The return of confidence to the scrap iron market and the settling of prices upon a firmer basis, have not come, despite all efforts of the dealers and several of the quotations have dropped below those of last week. Stove plate has been selling, f. o. b. dealers' yards, at $9.25, which is a drop in price of 25 cents a ton since last report. Heavy melting scrap is now being held at from $12.50 to $13, and bundled sheet scrap at from $9.50 to $10, both per gross ton. Malleable scrap has dropped 50 cents per net ton, and is now given at from $8.25 to $8.75. Dealers are cautious in regard to adding to stocks already on hand, and consumers are buying only as the scrap is actually needed, both apparently fearing to do much until conditions become more settled. We quote below prices dealers will pay and also dealers' selling prices in Cincinnati and vicinity as follows:

Gross Tons

Old iron rails	$14.25 to 14.75
Old steel rerolling	12.50 to 13.00
Old iron axles	18.75 to 19.25
Heavy melting scrap	12.50 to 13.00
Relaying rails	21.75 to 22.50
Bundled sheet scrap	9.50 to 10.00

Net Tons

Old No. 1 R. R. wrought	$12.00 to 12.50
No. 1 machinery cast	12.25 to 12.75
No. 1 busheling	10.00 to 10.50
Stove plate	8.75 to 9.25
Machine shop turnings	8.00 to 8.50
Cast borings	8.50 to 9.00
Heavy turnings	8.50 to 9.00
Mixed cast	11.00 to 11.50
Malleable	8.25 to 8.75

The Lima Locomotive Corporation, Lima, O., has secured a contract for 13 10-wheel locomotives from the Brazilian Railway Co., for use in Argentina.

PHILADELPHIA

Heavy Ante Election Buying

Office of THE IRON TRADE REVIEW,
Philadelphia, Nov. 5.

The surprising feature of the eastern Pennsylvania iron and steel market is the new buying activity that has continued up to the very eve of the election. While there has been some pause in new inquiries, pending the choice of a new president, buyers apparently saw no reason to defer action upon negotiations that were already under way and the tonnage closed has been heavy. This attitude of consumers is much different from that which they have usually displayed immediately prior to other presidential elections and it emphasizes the strength of the present conditions. Pig iron sales aggregating 30,000 to 35,000 tons were closed in this district in the week at higher prices and there has been a liberal movement in finished lines. Eastern iron mills are profiting in a very conspicuous way from the filled up condition of the steel plants, in bars and other products, and a manifest revival of the eastern Pennsylvania iron-making industry which has been at rather a low ebb for several years, is now under way. Steel makers continue to buy crude steel supplies in the eastern market. Old material is strong.

Pig Iron.—While the closing days of the presidential campaign have caused the eastern iron market to pause somewhat in initiation of new negotiations, it is surprising to what extent buyers who were already in the market were not willing to wait a few days for the final result of the election before closing upon their inquiries. Sales of fully 30,000 to 35,000 tons for deliveries as far ahead as first half were terminated at higher prices on the very eve of the election, furnishing a sharp contrast to the policy that has commonly been followed by buyers in other presidential years. The feature of the week has been the heavy buying of standard forge iron by eastern iron mills for a number of months ahead, this demand being precipitated by the much increased operations among the eastern puddling works. One eastern Pennsylvania iron manufacturer took 10,000 tons of this grade at $17.50, delivered, from a furnace in its immediate neighborhood, and some other lots were sold to slightly higher freight points at $17.75, delivered. An eastern pipe maker has been inquiring for 15,000 tons of pipe forge for first quarter and lower silicon iron against the possible receipt of an order for pipe of this tonnage which has been pending, but has since practically withdrawn this inquiry. Additional sales of 6,000 to 8,000 tons of basic are reported at about the price range of other recent sales which have been noted. A lot of 2,000 tons for first quarter was done at a shade below $18, delivered, on a quotation which was some days old. Another buyer took 3,000 tons for first quarter at $18.15, delivered to a higher freight point. Preceding these sales, a central Pennsylvania buyer had been inquiring for 1,500 tons for first quarter. A round tonnage of standard low phosphorus iron, aggregating about 10,000 tons for first half, largely for one eastern consumer, was done at $23.50, delivered. One leading seller is now quoting $24, delivered. Foundry irons have sold in the week, usually in small quantities, over the price range of $18 to $18.50, Philadelphia, for No. 2X. Several sales at the higher figure are noted. Foundry inquiry is light. One Virginia maker of special irons is selling at $17, furnace, and a number of sales are reported at the usual price of $16, furnace, for No. 2X, equivalent to $18.65 to $18.80, eastern Pennsylvania.

We quote for delivery over the rest of the year to consumers' plants in Philadelphia and vicinity, unless otherwise specified, as follows:

Eastern Pa. No. 1X foundry	$18.50 to 18.75
Eastern Pa. No. 2X foundry	18.00 to 18.50
Eastern Pa. No. 2 plain	17.50 to 18.00
Standard forge (Eastern Pa.)	17.50 to 17.75
Basic (Eastern and Central Pa.)	18.00 to 18.25
Virginia No. 2X	18.65 to 18.80
Southern No. 2	16.50 to 17.50
Malleable	19.50 to 19.75
Low phosphorus, Philadelphia	23.50 to 24.00

(First Quarter.)

Malleable	$19.50 to 19.75
Basic	18.00 to 18.25
Eastern Pa. No. 2X foundry	18.00 to 18.50
Eastern Pa. No. 2X plain	17.50 to 18.00
Standard gage (Eastern Pa.)	17.50 to 17.75
Virginia No. 2X	18.65 to 18.80
Low phosphorus, Phila.	23.50 to 24.00

Iron and Steel Bars.—The long extended deliveries of the steel bar mills which vary from three to five months are affording eastern iron mills greatly broadened opportunities for business in bar iron, muck bar and iron skelp and some heavy sales of these products have been made to eastern buyers. Regular steel bar consumers are now specifying either iron or steel in their inquiries. Bar iron prices are strong at 1.60c, upward, eastern mill. The Potts Bros. Co. iron mill, at Pottstown, which has been idle several years, will probably soon resume. Prompt steel bars continue to bring from 1.80c to 1.85c, Philadelphia or tidewater, these sales usually being made by re-rolling mills.

We quote for delivery to consumer's plants in Philadelphia and vicinity: Steel bars at 1.55c to 1.60c on contract and common bar iron at 1.67½c to 1.77½c. Prompt steel bars on mill shipments are quoted at 1.75c to 1.85c and from store are quoted at 2c to 2.15c. Cut nails are quoted from $1.85 to $1.90, Philadelphia.

Plates.—Some eastern makers of sheared plates are still able to make deliveries in from three to five weeks and are receiving 1.60c, Pittsburgh, or more on such business. These deliveries, however, are especially favorable, as other eastern makers report the continued entering of a heavy tonnage leading them to adopt more conservative policies in promising shipments or in selling ahead. Where contracts are taken, eastern mills quote 1.60c, Pittsburgh, or 1.75c, Philadelphia, on sheared plate and $1 more for universals, but will not go beyond the first quarter. An export inquiry for 7,000 tons is pending. For foreign shipments, eastern Pennsylvania makers are asking $1 higher than domestic and are quoting 1.80c, tidewater. Pittsburgh and middle western mills generally are sold up solid for three or more months ahead, but one maker has some offerings for eight weeks or thereabouts.

Structural Shapes.—An eastern shape maker who is promising deliveries within four weeks has been making sales of standard sections at from 1.70c to 1.75c, mill, usually at the latter figure. This interest is making a specialty of this character of business. Other eastern shape mills are unable to make shipments on tonnages of any assortment under 10 to 12 weeks. Their quotations are minimum at 1.50c, Pittsburgh, or 1.65c, Philadelphia, but on forward contracts 1.60c, Pittsburgh, or 1.75c, Philadelphia, is usually asked, with higher prices on miscellaneous business. A

sale of 2,000 tons for delivery, as the seller is able, is noted at the 1.75c, Philadelphia basis. The Pencoyd plant of the American Bridge Co. has withdrawn from the market as a seller of shapes owing to the increased demands of its fabricating shops. The Modern Structural Steel Co., Chicago, has taken 2,000 to 2,500 tons for the Red river bridge at Shreveport, La. W. P. Richards has the general contract and is taking bids on the 2,000 tons of steel for the Clyde Steamship pier at Charleston, Va. A stock house for the Bergner & Engle brewery, this city, 700 tons, is up for bids. Plans have been prepared for a large building for the Commonwealth bank, Richmond, Va.

We quote delivered to consumer's plants in Philadelphia and vicinity: Sheared steel plates, 1.65c to 1.75c; universal steel plates, 1.65c to 1.80c; structural shapes, 1.65c to 1.80c. Plates and shapes from store are quoted at 2.15c to 2.25c.

Sheets.—Deliveries on sheets with eastern makers continue to lengthen and on the heavier gages from three to four weeks and on the lighter weight from five to six weeks are scheduled. Eastern Pennsylvania mills have been selling blue annealed sheets for such deliveries up to 1.85c to 1.90c, Pittsburgh, for No. 10 gage, or 2c to 2.05c, Philadelphia. The market is active.

We quote for delivery to consumer's plants in Philadelphia and vicinity, No. 10 gage blue annealed sheets at from 1.90c to 2.00c.

Semi-Finished Steel.—Shortage in crude steel among steel makers continues to be manifested by their appearance in the open market as buyers of such material. An eastern steel company is inquiring for 6,000 to 8,000 tons of open-hearth billets per month for first quarter and has practically closed for this tonnage with another eastern maker. Round sales of slabs have been made to other steel companies. Sellers in the east who have steel to offer are holding Bessemer and open-hearth billets at a minimum of $28, mill, and forging billets at $34, mill base. The Alan Wood Iron & Steel Co. is now running practically full its Ivy Rock open-hearth with eight furnaces active.

We quote delivered to consumer's plants in Philadelphia and vicinity 4 x 4-inch open-hearth and Bessemer rolling billets at $28.50 to $30.50 and forging billets at from $34.50 to $38.50.

Old Material.—The market continues to hear reports of higher prices for heavy melting steel in eastern Pennsylvania, some of which still lack confirmation. One unconfirmed report is current that a large block of steel was done at $16.50, delivered eastern Pennsylvania, and one dealer has actually made offers slightly over $16, delivered. Practically all the steel makers are openly offering $15.50, delivered, but it is doubtful whether much tonnage could be had at that figure. There is a lively movement in cast scrap and higher prices are being paid. Eastern re-rolling mills are offering up to $19, delivered, for steel shafting. Offers around $17 failed to get any awards of re-rolling rails from the Pennsylvania and other railroad lists closed this week. These lists brought higher prices generally. The old material market has a good tone.

We quote gross tons, delivered to consumers' plants in western New Jersey and eastern Pennsylvania as follows:

Old iron rails	$18.50 to 19.00
Old steel rails (rerolling)	17.00 to 17.50
No. 1 heavy melting steel	15.75 to 16.00
Old car wheels	15.00 to 15.50
Old iron axles	24.00 to 25.00
Old steel axles	19.00 to 20.00
No. 1 railroad wrought	17.50 to 18.00
Wrought pipe	14.00 to 14.50
Cast borings	11.25 to 11.75
Machine shop turnings	11.50 to 12.00
Heavy cast	14.50 to 15.00
Malleable	13.25 to 13.50
Stove plate	11.50 to 12.00
No. 1 forge	14.00 to 14.50
Low phosphorus	19.00 to 19.50

Freight rates per ton on scrap from Philadelphia to principal eastern consuming points are: $0.60 to Ivy Rock, Pa.; $0.65 to Phoenixville, Pa.; $0.80 to Coatesville, Pa.; $0.85 to Bethlehem, Pa., Reading, Pa., and Roebling, N. J., $1.10 to Pottsville, Pa., Lebanon, Pa., and Columbia, Pa.; $1.20 to Harrisburg and Steelton, Pa.; $1.40 to Milton, Pa.

BIRMINGHAM

Buying Light, But Prices Firm

Office of THE IRON TRADE REVIEW,
Birmingham, Ala., Nov. 5.

Pig Iron.—The general condition of this market is practically the same as for some two weeks past. Buying in all sections of the trade is very light, and the conservative course that is being followed in the matter of future deliveries is more apparent; but calls against all contracts are still very heavy, and the accumulation of the several grades on furnace yards is being gradually cleaned up. In the past week, an aggregate of some 1,500 to 1,750 tons for early delivery was sold, and no lower figures than a basis of $14 per ton at Birmingham were considered. One lot of 450 tons of No. 2 soft, for strictly first quarter delivery, was sold in the week at $14.50 per ton, Birmingham, which price is the minimum now being quoted on certain brands. So far as is known, no solicitations are being made for second quarter contracts, but the available tonnage for earlier delivery at a basis of $14, Birmingham, has been increased through the offering of one large producer of such grades as are not applicable to specifications in hand. The attitude of those producing interests which have remained practically out of the market for some weeks past has not changed, and the trading recorded is largely with one producer and the several merchant interests.

Stock figures as of Nov. 1 have not been compiled. The active producing capacity on foundry iron, on that date, was represented by 14 stacks, with six stacks producing basic. Two additional stacks are to be blown in on foundry iron during the first half of this month, which, with the one stack to be blown in on charcoal iron, will make a total of 25 active stacks in the district. Of this total, it is probable that two stacks will be blown out for repair prior to Jan. 1, and commitments against the aggregate production are governed accordingly.

With the exception of an advance to a differential of 25 cents per ton for low grades, recently made by certain producers, the schedule of prices is about as last reported, and the condition of the market is considered very satisfactory to those concerned. We quote as below for any delivery prior to the second quarter, per gross ton, f. o. b. cars at Birmingham district furnaces, viz.:

For delivery during the remainder of this year and first quarter next:	
No. 1 foundry	$14.50 to 15.00
No. 2 foundry	14.00 to 14.50
No. 3 foundry	13.50 to 14.00
No. 4 foundry	13.00 to 13.50
Gray forge	12.50 to 13.00
Mottled	12.00 to 12.50
Standard basic	13.50 to 14.00
Off basic	11.00 to 11.50
Standard charcoal	24.50 to 25.00

With the exception of charcoal iron, an advance of 25c to 50c per ton would be asked over the above figures for deliveries in the last quarter.

Old Material.—The demand for all grades handled on local yards was decidedly stronger in the past week than in the week previous, and the prices received are more satisfactory.

We quote the prices being asked for the tonnage on hand, about as follows, per gross ton, f. o. b. cars here, viz.:

Old iron axles (light)	$15.50 to 16.00
Old steel axles (light)	15.50 to 16.00
Old iron rails	15.50 to 16.00
No. 1 R. R. wrought	13.50 to 14.00
No. 2 R. R. wrought	11.00 to 11.50
No. 1 country	9.50 to 10.00
No. 2 country	8.50 to 9.00
No. 1 machinery	11.50 to 12.00
No. 1 steel	11.50 to 12.00
Tram car wheels	11.00 to 11.50
Standard car wheels	12.50 to 13.00
Light cast and stove plate	9.50 to 10.00

NEW YORK

Railway Buying Very Active

Office of THE IRON TRADE REVIEW,
1115 West Street Bldg., Nov. 5.

Iron Ore.—The information that has gone forth in the eastern trade that the American office at Philadelphia of a leading seller of Spanish ore will be closed Jan. 1 illustrates the diminished offerings of European and trans-Atlantic ores to the eastern Pennsylvania market at present brought about by the more profitable selling opportunities for this material among foreign buyers. A sale of 45,000 tons of Wabana, Newfoundland, ore has just been made to Germany at the highest price ever paid by that country for this ore. Additional sales of 35,000 tons of Wabana ore to eastern Pennsylvania furnaces just made absorbs the full offering of this ore to this country and indicates that the next year movement of this material will reach about the normal figure of 200,000 to 250,000 tons. This ore has sold at 7¼ cents per unit of iron, f. o. b. cars Philadelphia, or from 8¼ to 8½ cents, delivered to the furnaces. A sale of 20,000 tons of a local New Jersey ore for next year is reported at the regular range of prices, which is from 7¾ to 8¼ cents per unit delivered, according to grade. Usually a minimum of 8 cents delivered is obtainable for first class ore.

Pig Iron.—The not uncommon election week quietness is upon the pig iron market and there has been a practical stagnation of business in this district during the past few days. The active tonnage has consisted of a number of small lots and sales have been wholly of this character. Where some round tonnages have been under negotiation, buyers appear in no hurry to make final decision. A pipe maker in this district is still carrying on desultory negotiations for a block of 6,000 to 8,000 tons of foundry grades for delivery to two plants over the second quarter. A Jersey consumer has put out a new inquiry for 3,600 tons equally divided between No. 1 and No. 2X for first half. Another Jersey consumer has inquired for 400 tons of high silicon iron for prompt shipment. Despite its quietness, the market manifests a steady strength. Eastern Pennsylvania prices for No. 2X range from $17.25 to $17.75, furnace, depending on delivery, and usually fall within the range of $18 to $18.50, tidewater. A central Pennsylvania maker has just announced a further advance of 25 cents from $17.25 to $17.50, furnace, or $19.35, tidewater. The going range at Buffalo is well represented by $17 to $17.50, furnace, for No. 2X. Buffalo makers have been selling considerable iron for Canadian shipments and because of their well-filled order books and the conditions with home furnaces, it is believed that Canadian consumers are likely to suffer serious shortages in the near future. Considerable demand for malleable and for low phosphorus irons approaching that grade is current in the east, the largest lots being in the Buffalo territory. Malleable is pretty scarce in the east and some sellers have been offering valley makers $17, furnace, or $19.85, tidewater, for iron for this year, or first quarter, but these have been refused. Some Buffalo makers have some stocked and free forward malleable which they are offering at $17.50, furnace. Some sales on this basis are noted. The scarcity of coke malleable has forced some makers to buy charcoal iron of similar grading. A sale of 500 tons on the full charcoal basis of $18.75, Buffalo, is noted. The Standish, N. Y., furnace, making a low phosphorus, has gone out temporarily for repairs, but will resume around the middle of December. The export inquiry for 3,000 to 5,000 tons of southern No. 3 for shipment to Rotterdam, Trieste or Genoa, is still pending and a new export inquiry for 1,000 tons of high silicon iron has come out. We quote for early shipment at New York tidewater as follows:

Northern foundry No. 1	$18.50 to 18.75
Northern No. 2X foundry	18.00 to 18.50
Northern No. 2 plain	17.50 to 18.00
No. 2 Virginia	18.80
No. 2 southern foundry	18.25 to 18.50
Malleable	19.00 to 19.25
Gray forge	17.00 to 17.50

(First Quarter.)

Northern No. 2X foundry	$18.25 to 18.50
Northern 2 plain	18.00 to 18.25
No. 2X Virginia	18.80
No. 2 Southern	18.25 to 18.75

Ferro-Alloys.—On account of the unsettled conditions surrounding their sources of ore supply, precipitated by the Balkan war disorders, along with the fact that they are well sold up, leading English makers of ferro-manganese remain completely out of the market. With these the established forward price of $61, seaboard, has become quite nominal. Domestic sellers who have some tonnages on hand are advancing their spot quotations and $75, seaboard, is now asked by some. There is very little inquiry in the market at present consisting usually of carloads. Several new inquiries for carload lots of 50 per cent ferro-silicon have appeared.

We quote standard English 80 per cent ferro-manganese at from $70 to $72, seaboard, for early shipment and at $61, seaboard, for delivery after Jan. 1 and 50 per cent ferro-silicon on contract at $75, Pittsburgh or Philadelphia for carloads, $74, for larger lots, and $73, for 600 tons or more. For this year, the 50 per cent ferro-silicon schedule is $2.50 less.

Plates.—October proved the banner month of the year in car buying and the known orders then placed reached from 40,000 to 45,000. This compares with 95,000 cars placed in the seven months to Aug. 1. The remarkable buying movement in equipment which car builders say is almost unprecedented in its extent, continues, and active inquiries are fully 30,000. It is well established the New York Central lines will buy an unusually large block which may reach 15,000 or 20,000. The Norfolk & Western is inquiring for 5,000; the Chesapeake & Ohio for 4,000; the South Buffalo Railway Co. for 500. It is assured the Rock Island will soon place a considerable amount of equipment. The Harriman lines are out for 70 coaches. A new order of the week calls for 1,000 hopper and 1,000 box to the Pressed Steel Car Co. and 600 box each to the American Car & Foundry Co. and to the Standard Steel Car Co. for the Pennsylvania Lines West. The Pressed Steel Car Co. has 500 general service and 200 ore cars of the recent Northern Pacific order. Car builders and other large consumers are having trouble to get plates in any quantity from the leading mills much this side of July 1, and the principal business of the market before that time is being done by smaller mills usually on a minimum of 1.60c, Pittsburgh, or 1.76c, New York, with higher prices for very nearby shipment. An in-

quiry for 4,500 tons of plates for a pipe line in this territory is pending.

We quote, delivered at New York tidewater on going business, for last quarter or first quarter, 1.76c, New York, on sheared plates. Some makers are asking $1 higher for universal plates. Plates from store are quoted at 2.15c.

Shapes.—Eastern shape mills which are not sold up ahead and are promising deliveries around four weeks, are selling freely at 1.75c, mill, or about 1.85c, New York. Eastern sellers with more extended deliveries running 10 weeks or so are quoting 1.50c to 1.60c, Pittsburgh, or 1.66c to 1.76c, New York. The 1.50c quotation of the leading middle western mills remains practically nominal as deliveries are available for a number of months. Some large independent companies with specifications on hand for four months ahead, are not quoting at all. Fabricating prices in this district continue to advance and apartment and loft construction is going at from $65 to $70 per ton erected.

New lettings are of fair volume. The American Bridge Co. now officially announces it has closed the contract for the Adams Express Co. building, this city, to require about 11,000 tons and has taken 400 tons for a steel crossing for the Baltimore & Ohio railroad, Baltimore; the Fort Pitt Bridge Works has 1,000 tons for 32 spans for the Long Island railroad; the Hinkel Iron Works, 300 tons for the Hall Realty Co. apartment on Ninety-second street, near West End avenue, this city; the Pennsylvania Steel Co., a small tonnage for bridge work for the Philadelphia & Reading; 350 tons for bridges at Clinton, Mass., and Boston, for the Boston & Maine have gone to independent shops. E. E. Paul has the general contract for the Cruikshank warehouse at Fourth and Gansevoort streets, this city, to require 1,500 tons, but the steel has not yet been placed. The Pennsylvania railroad is reported to be planning a 23-story hotel opposite the Pennsylvania station on Seventh avenue. The Delaware, Lackawanna & Western railroad will shortly inquire for a considerable quantity of bridge work.

We quote for New York delivery as follows: Structural shapes, 1.66c to 1.76c. Structural shapes from store, 2.15c.

Iron and Steel Bars.—Premiums of from $4 to $6 a ton above the 1.40c, Pittsburgh, price continue to be done on prompt steel bars by the smaller eastern mills. All the leading steel bar makers are heavily sold up and some are not quoting at all. Local New Jersey mills continue to sell bar iron at 1.55c to 1.65c, New York, or 1.50c to 1.60c, mill, but leading eastern Pennsylvania makers are more uniformly quoting around 1.60c, mill. Bar iron is moving well.

We quote for New York delivery, steel bars at 1.56c and common iron bars at 1.55c to 1.65c. Steel bars from store are quoted at 2 cents.

Rails and Track Material.—Rail buying in the east has continued active. The Baltimore & Ohio railroad has closed for a round tonnage for next year, of which 9,500 of Mayari Bessemer rails will be furnished by the Maryland Steel Co. The main tonnage went to the Pittsburgh maker. The Lehigh Valley railroad has closed for 30,000 tons or more of open-hearth rails for next year, of which 10,000 went to the Pennsylvania Steel Co., 10,000 to the Carnegie Steel Co. and some tonnage was placed with other mills. The Southern railroad has placed 9,500 tons, of which 4,000 tons Mayari Bessemer were taken by the Maryland Steel Co., 2,500 tons by the Tennessee Coal, Iron & Railroad Co., and 1,500 tons each by the Lackawanna and Bethlehem Steel companies. The Interborough Rapid Transit Co., New York, has taken 7,000 tons, largely, it is understood, from the Buffalo mill, with 1,000 tons going to the Pennsylvania Steel Co. The latter also has 1,000 tons of girder rails for the Transit Development Co. of Brooklyn. The railroads continue to buy splice bars, track bolts, tin plates and other track fastenings in very heavy quantities and some enormous inquiries are now pending. It is believed that American mills will eventually receive the order of the Trans-Continental Railways of Australia for 160,000 tons, the initial contract against which will probably be about 50,000 tons. The Michigan Engineering Co. is inquiring for 6,250 tons of 80-pound rails for a Michigan traction line.

Cast Iron Pipe.—Bids were taken this week by the city of Providence, R. I., upon 3,000 tons of 6 to 30-inch pipe. Public lettings are comparatively few at this season, but there is a sharp demand from the private consumers for next year deliveries. Prices are steadily increasing in strength.

We quote six-inch pipe at from $23.00 to $24.00, f. o. b. New York, in carload lots.

Semi-Finished Steel.—The New York State Steel Co., Buffalo, started this week its steel plant, consisting of two 200-ton Talbot and one 50-ton open-hearth basic furnaces, which has been idle for several years. This maker has booked a round tonnage of billet orders against this capacity. Open-hearth rolling billets are quoted in the eastern market at $28, mill, and forging billets at $35 and higher at eastern mill. Some sizeable sales at these prices are noted.

Old Material.—The feature of the market is the heavy demand for cast scrap and a large tonnage is now under negotiation. Many of the iron foundries in this territory are in the market and are paying advancing prices. There is a heavy movement of old material to consumers against former orders and the plants are receiving so liberal a tonnage that the material is being scanned more critically. Some further embargoes are threatened. Eastern makers are not buying very actively. There are continued reports that $16, delivered eastern Pennsylvania, have been done on heavy steel, but one large buyer has only advanced its offers in the week to $15.50. We quote, gross tons, prices New York dealers will pay at tidewater, as follows:

Old car wheels	$13.50
Old iron axles	22.00 to 22.50
Steel axles	16.50 to 17.00
Old steel shafting	16.00 to 16.50
No. 1 heavy melting steel	13.25 to 13.50
No. 1 R. R. wrought	15.00 to 15.50
Wrought pipe (not galvanized)	12.00 to 12.25
Cast borings	9.00 to 9.25
Machine shop turnings	10.00 to 10.25
Heavy cast	11.50 to 12.00
R. R. malleable	11.75 to 12.00
Stove plate	9.25 to 9.50
Grate bars	8.25 to 8.50

Freight rates on scrap per ton to Steelton, Pa., Columbia, Pa., Pottsville, Pa., and Harrisburg, Pa., are $1.50 from Jersey City, and $2.00 from New York; to Coatesville, Pa., Ivy Rock, Pa., Phoenixvile, Pa., and Reading, Pa., $1.50 from Jersey City, and $1.80 from New York; to Bethlehem, Pa., $1.10 from Jersey City, and $1.60 from New York; to Roebling, N. J., $1.00 from Jersey City, and $1.50 from New York; to Milton, Pa., $1.60 from Jersey City, and $2.00 from New York; to Jersey City, $1.00 from New York; to Newark, $1.10 from New York

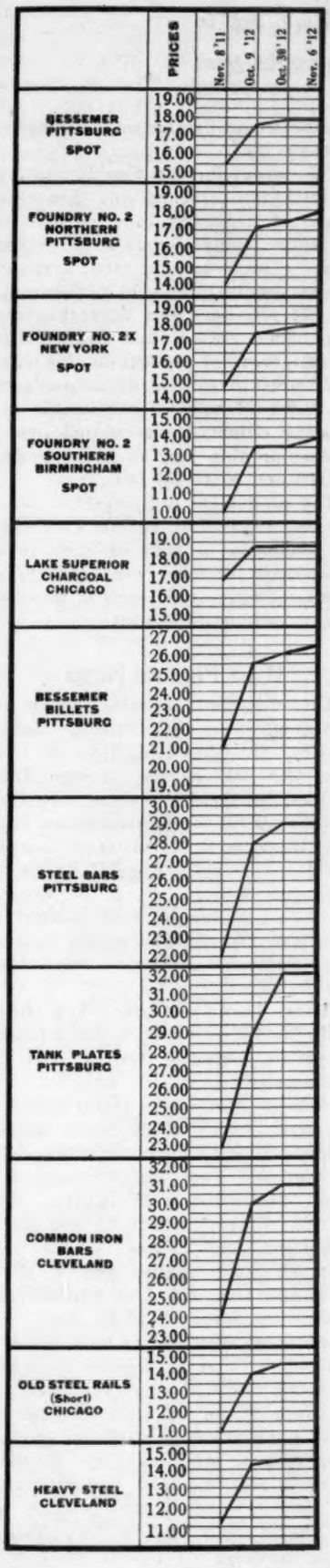
Will Rebuild Stack

The Republic Iron & Steel Co., Youngstown, O., has completed plans for the rebuilding of No. 1 stack, at Hazelton, O.—the old Andrews Bros. Co. furnace, taken over at the time the Republic company was organized. Work will start as soon as possible, as the company is desirous of using the output of this furnace.

The Midland, Pa., furnace of the Pittsburgh Crucible Steel Co., Pittsburgh, will be relined before Jan. 1, although no definite plans have been announced. This stack has operated five or six years on one lining.

The Ohio Society of Mechanical, Electrical and Steam Engineers will meet at Akron, O., on Nov. 21 and 23. There will be a number of addresses given and papers will be read on technical subjects by prominent engineers. Visits will be made to manufacturing plants in Akron and Barberton, O.

PRICE CHART



BUFFALO

Pig Iron Prices Still Tend Upward

Office of THE IRON TRADE REVIEW,
Buffalo, Nov. 5.

Pig Iron.—The sold-up condition of the furnaces, coupled with the heavy demand of the melters, makes the iron scarcity in this section more and more apparent. Prices have stiffened again on practically all grades to a point where little or nothing can be obtained below $17. The change, as noted below, has occasioned a closing in of the range by raising the minimum rather than the maximum. There was a lull in the placement for the week, marking the first indications this season that the trade has been influenced by the proximity of a presidential election. Apparently the group of buyers involved decided to await the outcome of the election before placing their orders. The demand of the foundries for iron has broken all previous records for increases in consumption. They report an improvement in the labor situation and the indications are that the demand from now until the first of the year will involve a large tonnage. The following schedule substantially represents the market for the week, f. o. b. Buffalo:

No. 1X foundry	$17.50 to 17.75
No. 2X foundry	17.25 to 17.50
No. 2 plain	17.00 to 17.25
No. 3 foundry	17.00 to 17.25
Gray forge	16.75 to 17.00
Malleable	17.50 to 17.75
Basic	17.50 to 18.00
*Charcoal	18.75 to 21.25
*Some grades and brands	22.00

Old Material. — The scrap market experienced a slackening of activity in the week before election, but the falling off in inquiries and sales occasioned no changes in the range of prices, which remains the same as the previous week. The schedule, f. o. b. Buffalo, for gross tons, is substantially as follows:

Heavy melting steel	$14.75 to 15.25
No. 1 railroad wrought scrap	15.75 to 16.25
No. 1 R. R. and mch. cast sc'p.	14.00 to 14.50
Old steel axles	16.00 to 16.75
Iron axles	23.50 to 24.00
Car wheels	15.50 to 16.25
Railroad malleable scrap	13.75 to 14.25
Wr'ght iron and soft steel turn.	8.75 to 9.00
Cast iron borings	8.00 to 8.50
Low phosphorus steel scrap	17.00 to 17.50
Old iron rails	15.50 to 16.00
Tank iron	10.75 to 11.25
Boiler plate, sheared	15.00 to 15.50
Pipe and tank	10.50 to 11.00
Stove plate	11.25 to 11.75
Sheet iron	7.75 to 8.25
Locomotive grate bars	11.75 to 12.25

METAL MARKETS

Copper Quiet—Tin Sells Freely

New York

Nov. 5.

Copper.—Leading sellers have not pressed sales in a market practically devoid of inquiry, and their prices are unchanged from those of recent weeks. Electrolytic is held at 17.62½c cash, New York, and 17.75c delivered 30 days, and lake at 17.75c and 18c, by the important agencies. An insignificant tonnage of copper has been disposed of by other interests at around 17.37½c for electrolytic during the past week to domestic consumers who, while not anxious to buy, were willing to take advantage of the concessions in prices.

Tin.—Sellers displayed more or less anxiety to do business during the week and those who were in the market to buy had little difficulty in getting the metal at prices slightly under cost to import. This demand did not extend beyond immediate consumption needs, however. The average price of the week is about 50.20c for prompt metal.

Spelter.—The United States Steel Corporation is reported to have bought a large amount of spelter during the past week. If true, the action had little effect on prices, as prevailing quotations are unchanged from last week. Prime western is offered at 7.45c, in New York, for November

Chicago

Nov. 5.

New Metals.—With the exception of antimony the market for new metals shows considerable weakness. Both lead and spelter have fallen off and copper is quoted from ¼c to ⅜c lower.

We quote, dealers' selling prices, f. o. b. Chicago, as follows:

Lake copper, carload lots, 17⅜c; casting, 17⅛c; smaller lots, ¼c to ¾c higher. Spelter, car lots, 7.40c; lead, desilverizing, 4.90c; sheet zinc, 9c, f. o. b. Lasalle, in car lots of 600-pound casks; pig tin, 50.12c; Cookson's antimony, 10½c; other grades, 9⅜c.

Pig Iron Production Makes New High Record

Output in October Was 970 Tons Above Previous High Mark Set in December, 1909—Daily Average Increases While 22 Stacks Were Relighted

All monthly records for the production of coke and anthracite pig iron were broken during October, when 286 blast furnaces poured out 2,683,672 tons of pig iron. This total surpassed by 970 tons, the previous record of 2,682,702 tons established in December, 1909. In addition, it was the third time in the history of the American iron industry that more than 2,600,000 tons have been made in one month, that figure having been reached in October, 1909, as well.

Of hardly less interest, was the surprising increase in the number of stacks in blast. The number active on Oct. 31 was 280, against 262 on the last day of September, a net gain of 18. This closely approached the record for stack resumption in one month. Twenty-two stacks in all were relighted, while four were blown out. Of the steel works, or non-merchant furnaces, 12 were blown in and two put out. Ten merchant stacks were blown in and two blown out.

The daily average output in October was 86,570 tons, a gain of 5,088 tons over September and the second best average in history. In February, 1910, the daily output averaged 86,748 tons, an increase of 178 tons over the October figure for this year.

The production in October, compared with the preceding month, showed a tremendous gain of 239,218 tons, the totals being 2,683,672 tons and 2,444,454 tons respectively.

Proportionately, the increase was about evenly divided between the merchant and non-merchant furnaces. The production of steel works, or non-merchant stacks, in October was 1,956,143 tons, against 1,768,992 tons in September, a gain of 187,151 tons. The merchant iron produced last month was 698,435 tons compared with 650,505 tons in September, an increase of 47,930 tons.

The output for the first 10 months of 1912 has reached the imposing figure of 23,908,686 tons, surpassing the entire output for 1911 by 710,085 tons. The total for the first 10 months of 1911, was 19,167,200 tons, or 4,741,486 tons less than the corresponding period this year. The monthly rate of production this year is 2,390,869 tons, or at the annual rate of 28,690,428 tons. The rapidly increasing output, however, indicates a production this year of between 29,000,000 and 30,000,000 tons.

The production of spiegel in October was 10,254 tons, against 7,985 tons in September, a gain of 2,269 tons. The output of ferro was 18,840 tons, compared with 16,972 tons in September, a gain of 1,868 tons.

RECORD BREAKING MONTHS IN PAST FIVE YEARS.

	Tons.
October, 1907	2,359,690
September, 1909	2,375,589
October, 1909	2,604 037
December, 1909	2,682,702
October, 1912	2,683,672

AVERAGE DAILY PRODUCTION.

	1912.	1911.
January	66,220	56,989
February	72 372	63,617
March	77,791	69,863
April	79,254	68,163
May	80,753	60,367
June	81,125	59,109
July	77.502	57,294
August	80,650	61,995
September	81,482	65.797
October	86,570	67.486
November	.....	66,637
December	.....	65.558

MONTHLY PRODUCTION.

	1912.	1911.	1910.
January	2,252,806	1,766,658	2,599,995
February	2,098,796	1,781,285	2,428,937
March	2,411,529	2,165 764	2,588,736
April	2,377,621	2,044,904	2,477,700
May	2 503,341	1,871,388	2,374,802
June	2,433,737	1,773,282	2,288,279
July	2,402,567	1.776.108	2,158,124
August	2,500,163	1,921,832	2,103,791
September	2,444 454	1,973,918	2,048,461
October	2,683,672	2,092,061	2,086,205
November	.....	1,999,100	1,910,385
December	.....	2.032,301	1,779,899
Total	23,908,686	23,198,601	26,845,314

Blast Furnace Notes

The merchant furnaces blown in last month were the following: Hattie Ensley, Sloss-Sheffield Steel & Iron Co., Oct. 20; Norton, Norton Iron Works; Northern, Northern Iron Co.; one Susquehanna, Rogers-Brown Iron Co.; Niagara B, Tonawanda Iron & Steel Co.; Union, Rogers, Brown & Co.; one Brooke, E. & G. Brooke Iron Co.; Macungie, Empire Steel & Iron Co., Oct. 22; Sharpsville, Sharpsville Furnace Co., Oct. 7; Alice, Valley Mould & Iron Co.

Those blown out were Tod, Brier Hill Steel Co., Oct. 29, for relining; Rockdale, Rockdale Iron Co., Oct. 23, for repairs.

Among steel works furnaces blown in were: One at New South Works, Illinois Steel Co., Oct. 26; Lorain No. 4, National Tube Co., Oct. 30; Belfont, Belfont Iron Works Co., Oct. 17; one Columbus, Oct. 23, one Edgar Thomson, Oct. 8, one Isabelle, Oct. 14; one South Sharon, Oct. 6, all of Carnegie Steel Co.; one Shoenberger, American Steel & Wire Co.; "G", Bethlehem Steel Co., Oct. 10; Aliquippa No. 4, Jones & Laughlin Steel Co.; Steelton No. 4, Pennsylvania Steel Co.

Those blown out were Lackawanna No. 3, Lackawanna Steel Co., Oct. 28, for repairs; Alabama City, Southern Iron & Steel Co., Oct. 9, for relining.

The Toledo Supply Co., Toledo, has increased its capital stock from $25,000 to $50,000.

OCTOBER PIG IRON.

States.	No. of stacks.	No. in blast last day of month. Oct.	Sept.	Total tonnage made. Merchant.	Non-Merchant	Totals— Oct.	Sept.
Pennsylvania	159	120	108	200,306	924 464	1,124,770	996,238
Ohio	72	56	53	174,302	445,492	619,794	567,050
Alabama	45	21	21	108,656	50,178	158,834	153,374
Virginia	21	6	6	16,930	.....	16,930	22,597
New York	26	19	17	70,192	111,341	181,533	164 017
New Jersey	7	1	1	5.370	.....	5,370	5,693
Illinois	26	21	20	34,611	221,470	256,081	240,028
Colorado	6	3	3				
Indiana	13	10	10				
Maryland	4	2	2				
Wisconsin	6	3	3	17,343	175,706	193,049	187,215
Kentucky	7	2	1				
West Virginia	4	3	3				
Tennessee	18	9	10				
Washington	1	.	.	43,221	27,492	70,713	56,217
Georgia	2	.	.				
Texas	3	.	.				
Minnesota	1	1	1				
Michigan	3	3	3				
Missouri	1	.	.	27,504	.....	27,504	27,068
Spiegel—All states...						10 254	7 985
Ferro—All states....						18,840	16 972
Totals	422	280	262	698,435	1,956,143	2,683,672	2,444,454

Decline in Iron Content of Lake Superior Ores

During the Past Ten Years—Guaranty of Base Ore May Be Lowered—Marked Decrease in Percentage of Bessemer Ores on Mesabi

The extent to which Lake Superior ores have decreased in iron content and increased in phosphorus content during the past 10 years is disclosed in a very impressive manner by the accompanying tables. In figuring ore values of the output of the Lake Superior mines, it has always been the custom to base calculations on a so-called base ore. Down to 1907, the base for old range ores was a hypothetical ore, containing 63 per cent of metallic iron, 0.045 per cent of phosphorus and 10 per cent of moisture, giving a natural iron content of 56.70 per cent. The base for the non-Bessemer ores until 1907 was a hypothetical ore containing 60 per cent of metallic iron and 12 per cent of moisture, giving a natural iron content of 52.80 per cent, except for Mesabi non-Bessemer for 1905 and 1906, when the natural iron content was 53 per cent. Before the sales for delivery in 1907 were made, it was generally recognized that Lake Superior ores had deteriorated to such an extent in iron content that the time had come for a change in the base ore. Hence, the hypothetical base ore was changed to one having 55 per cent metallic iron for the old range and Mesabi Bessemer and 51.50 per cent for the old range and Mesabi non-Bessemer. This base has not since been changed, but the ores have steadily continued to decrease in iron content, and ore men are now discussing the advisability of again lowering the guaranteed metallic iron content.

The statistics of iron and phosphorus content for 1912 are not yet available, but ore authorities state that there is no question that the average iron content for 1912 will be less than for 1911. As a rule, the Steel Corporation properties are superior to those held by the independents. Hence, if the ores sold in the open market were separated from those held by the Steel Corporation and other ore producing-consuming interests, the percentage of iron content would be lower than as shown for the total. Comparing 1902 with 1911 in Bessemer ores, the Gogebic range shows a decrease in iron content of only 1.2 per cent, and the Vermillion, owned entirely by the Steel Corporation, shows a decrease of only 1.95 per cent. Bessemer ores on the Marquette range declined 4.2 per cent, while those on the Menominee declined 8.35 per cent. The Mesabi Bessemers show a decline of 3.82 per cent. In phosphorus content, large increases are shown in the average phosphorus content on the Marquette, Menominee and Mesabi ranges, while little change has taken place on the Gogebic and Vermillion. Taking the average iron content of all the Bessemer ores, it is found that there has been a decline of 3.7 per cent.

On the non-Bessemer ores, the decline has been even greater, it being 4.15 per cent on the total tonnage, and as follows on the different ranges: Gogebic, 0.86; Marquette, 2.63; Menominee, 2.26; Vermillion, 2.40; Mesabi, 4.10. The average iron content of all the non-Bessemer ores declined 4.15 per cent.

In the accompanying tables the low grades, silicious and manganifer-

TABLES SHOWING AVERAGE IRON (NATURAL) AND PHOSPHORUS OF BESSEMER ORES, BY RANGES, AND PERCENTAGE OF BESSEMER AS TO NON BESSEMER GRADES FOR THE SEASONS 1902 AND 1908 TO 1911 INCLUSIVE.

Gogebic Range.

Year.	Tonnage.	Av. iron, (natural).	Av. phosphorus.	Per cent Bes'm'r
1911.....	1,719,686	54.5312	0.04300	73.3
1910.....	3,356 835	53.8135	0.04183	80.8
1909.....	2,813,031	53.6253	0.04249	59.4
1908.....	1,895,568	53.8763	0.04219	74.5
1902.....	2,796,545	55.7324	0.04184	66.6

Marquette Range.

Year.	Tonnage.	Av. iron, (natural).	Av. phosphorus.	Per cent Bes'm'r
1911.....	772,911	54.0668	0.03746	31.1
1910.....	995,392	55.0838	0.04490	25.5
1909.....	950,426	57.1336	0.04539	25.8
1908.....	728.883	55.8231	0.04515	33.4
1902.....	1,054,757	58.2631	0.04239	29.9

Menominee Range.

Year.	Tonnage.	Av. iron, (natural).	Av. phosphorus.	Per cent Bes'm'r
1911.....	460 632	49.3616	0.04886	16.0
1910.....	513,208	50.2461	0.05042	13.9
1909.....	643,903	50.8448	0.04992	15.4
1908.....	397 253	49.7064	0.05269	18.8
1902.....	86,018	57.7141	0.01674	2.8

Vermillion Range.

Year.	Tonnage.	Av. iron, (natural).	Av. phosphorus.	Per cent Bes'm'r
1911.....	890,419	59.5940	0.03837	82.7
1910.....	933,147	60.1133	0.03745	78.2
1909.....	896,690	60.3218	0.03904	81.7
1908.....	698,696	60.4392	0.03913	83.8
1902.....	1,639,108	61.5522	0.03983	80.1

Total Old Range.

Year.	Tonnage.	Av. iron, (natural).	Av. phosphorus.	Per cent Bes'm'r
1911.....	3,843,648	54.9910	0.04017	43.8
1910.....	5,798.582	54.7297	0.04241	44.8
1909.....	5,304,050	55.0494	0.04333	41.8
1908.....	3 720,400	55.0453	0.04331	48.6
1902.....	5,576,428	57.9523	0.04097	47.4

Mesabi Range.

Year.	Tonnage.	Av. iron, (natural).	Av. phosphorus.	Per cent Bes'm'r
1911.....10,966,227		52.8467	0.04646	50.9
1910.....13,903,109		53.2647	0.04662	48.9
1909.....13,853,548		53.0427	0.04568	49.5
1908.....10,183,444		53.8430	0.04505	59.5
1902.....10,618,878		56.6690	0.03948	80.6

Total Bessemer.

Year.	Tonnage.	Av. iron, (natural).	Av. phosphorus.	Per cent Bes'm'r
1911.....14,809,875		53.4032	0.04483	48.9
1910.....19,701,691		53.6958	0.04538	47.6
1909.....19 157.598		53.5983	0.04504	47.1
1908.....13,903,844		54.1646	0.04459	56.1
1902.....16,195,306		57.1109	0.03995	64.9

AVERAGE PERCENTAGE IRON (NATURAL), OF TOTAL BESSEMER AND NON BESSEMER ORES

Old Range.

1911.....	53.5859
1910.....	53.4443
1909.....	53.4921
1908.....	53.6873
1902.....	56.3991

Mesabi Range.

1911.....	51.1842
1910.....	51.4195
1909.....	51.4814
1908.....	52.6552
1902.....	56.0663

TABLES SHOWING AVERAGE IRON (NATURAL) OF NON BESSEMER ORES, BY RANGES, AND OF TOTAL BESSEMER AND NON BESSEMER ORES OLD RANGE AND MESABI, FOR THE SEASONS 1902 AND 1908 TO 1911 INCLUSIVE.

Gogebic Range.

Year.	Tonnage.	Average iron, (natural).
1911.....	625,237	52.9294
1910.....	793,953	52.5195
1909.....	921,681	51.9797
1908.....	646,106	52.4304
1902.....	397,726	53.7872

Marquette Range.

Year.	Tonnage.	Average iron, (natural).
1911.....	1,712,619	52.4737
1910.....	2,904,774	52.7952
1909.....	2.724 318	52.9033
1908.....	1,450,283	52.3088
1902.....	2,464,187	55.1032

Menominee Range.

Year.	Tonnage.	Average iron, (natural).
1911.....	2,406,315	51.8411
1910.....	3,162,027	51.3579
1909.....	3,528,481	51.5608
1908.....	1,704,970	51.7801
1902.....	2,919,762	54.1020

Vermillion Range.

Year.	Tonnage.	Average iron, (natural).
1911.....	185 116	59.5984
1910.....	259,258	60.2483
1909.....	200,437	61.2379
1908.....	134,231	61.2246
1902.....	406,784	61.9984

Total Old Range.

Year.	Tonnage.	Average iron, (natural).
1911.....	4,929,287	52.4903
1910.....	7,120.022	52.7976
1909.....	7,374,917	52.3721
1908.....	3,935,590	52.4038
1902.....	6,188,459	54.9995

Mesabi Range.

Year.	Tonnage.	Average iron, (natural).
1911.....	10,547 865	49.4558
1910.....	14 523,702	49.6532
1909.....	14,089,886	49.9464
1908.....	6,934,167	50.9109
1902.....	2,546,936	53.5531

Total Non Bessemer.

Year.	Tonnage.	Average iron, (natural).
1911.....	15,477.152	50.4222
1910.....	21,643,724	50.5560
1909.....	21,464,803	50.7798
1908.....	10 869,757	51.4514
1902.....	8,735,395	54.5778

ous ores have been left out entirely.

While the average iron content of the old range Bessemer ores is practically the same as the base guarantee and that of the old range non-Bessemer is about 1 per cent above, both the Bessemer and non-Bessemer grades of Mesabi ores are fully 2 per cent below the base. This brings the average of all Bessemer ores down to about 1½ per cent below the base and that of the non-Bessemer to about 1 per cent below.

Although the average is usually higher in years showing a marked decrease in the amount shipped, all grades, with the exception of the old range Bessemer, show a decrease in the iron content for 1911.

The average of the iron is decreasing much more rapidly in the Mesabi than in the old range ores and the phosphorus content is increasing a great deal faster in the former than in the latter. In this connection it will be noted that while 80 per cent of the Mesabi ores shipped in 1902 were Bessemer, the percentage of Bessemer in 1911 was only 50.

Theoretically, a Bessemer ore is one having one one-thousandth of 1 per cent of phosphorus to 1 per cent of metallic iron, but in practice, it is found easily practicable to mix Bessemer analyzing 0.060 in phosphorus and non-Bessemer grades so as to product Bessemer pig iron which must analyze 0.10 in phosphorus, and it is customary to treat all ores running 0.060 and under in phosphorus as Bessemer grade. They have been so treated in preparing these tables, but in the case of the Menominee range the ores, while they come well within the phosphorus limit, are, with the exception of two or three small shippers, so low in iron that they probably could not be sold on the market as Bessemer ores. Thus the average of that range for the years 1908 to 1911 inclusive is very low in iron and high in phosphorus. If, therefore, the Menominee ores are eliminated entirely from the Bessemer list, the average of the old range Bessemer ores for these years will be as shown below, which is undoubtedly nearer the average of Bessemer ores sold.

AVERAGE IRON AND PHOSPHORUS OF OLD RANGE BESSEMER ORES WITH MENOMINEE RANGE ELIMINATED.

Year.	Tonnage.	Av. iron, (natural).	Av. phosphorus.
1911.....	3,383,016	55.7576	0.03899
1910.....	5,285,374	55.1650	0.04164
1909.....	4,660,147	55.6303	0.04242
1908.....	3,323,147	55.6832	0.04219

One of the most remarkable facts shown by the tables is the rapid decline in the percentage of Bessemer ores on the Mesabi range. It will be noticed that in 1902, 80.6 per cent of the Mesabi ores were of Bessemer grade, while in 1911, only 50.9 per cent were of Bessemer grade. It is probable that the percentage of Bessemer ores on the Mesabi range for 1912 will fall 4 per cent as compared with 1911. There will also be a sharp decline in old range ores, but the decline in old range ores from 1902 to 1911 has been only 3.6 per cent.

FOREIGN ORE DEMAND

May Close American Office of Spanish Seller.

The eastern trade has learned that the American office at Philadelphia of the Spanish ore firm of Sota & Aznar, London, will be closed Jan. 1 because in the present prosperous conditions of the European iron and steel industry, this ore seller has a restricted tonnage of material to offer for importation to the furnaces along the Atlantic seaboard. This contemplated action of a seller which has been so prominent in the movement of foreign ore to this country in recent years is illustrative of the diminished attraction offered by the iron industry of the United States for the bringing in of European and trans-Atlantic ore, against the more profitable selling opportunities in the home markets and the almost prohibitive ocean freights now prevailing.

Will Make Strip Steel Specialties

The Weirton Steel Co., recently organized, has completed plans for the erection of a plant at Weirton, W. Va., to be put in operation about June 1, 1913. The company's raw material will be bands, from which it will manufacture strip steel specialties exclusively. It is planned to make the new plant the most modern and complete of its kind in the country. The company is capitalized at $300,000, and its officers are as follows: President, E. T. Weir; vice president, E. W. Mudge; secretary, S. L. McCormick; treasurer, W. B. Dickson, and general manager, T. L. Harper. Messrs. McCormick and Harper were formerly connected with the West Leechburg Steel Co.

Special Agent Henry M. O'Bleness, of the United States department of justice, who for two years has had headquarters at Pittsburgh, has resigned from the government service to accept a position with the legal department of the Carnegie Steel Co., that city.

UNUSUAL ATTRACTIONS

Planned for Meetings of Chicago Foundrymen on Nov. 9.

Chicago, Nov. 5.—Special entertainment has been provided for the regular monthly meeting of the Chicago Foundrymen's Club, which will be held in the Gray Room of the Hotel Sherman on Saturday evening, Nov. 9. Full details of the affair are being withheld by the entertainment committee. The announcements state that M. Chaplet de Ferrous, foundryman extraordinary to his majesty the sultan of Sulu, has been engaged to deliver his famous lecture entitled, "The Tricks of My Trade" and that he will be accompanied by his two valets who will pull off some special stunts. The entertainment will commence at 8:00 p. m.

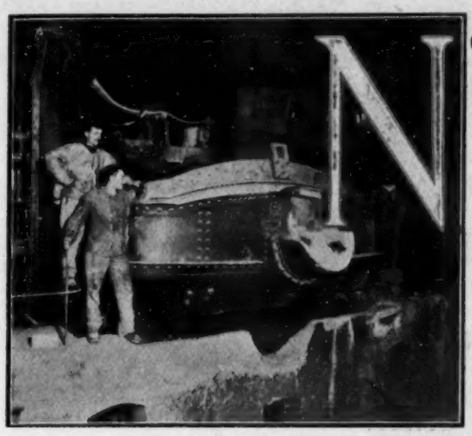
The Chicago Foundrymen's Club has also arranged for another special meeting which will be held Saturday evening, Dec. 14. At that time Rogers, Brown & Co's. series of moving pictures on the iron industry, entitled "From Mine to Molder", will be shown for the first time in Chicago.

Hoop and Band Plant at Alton, Ill.

A steel hoop and band plant will be erected at Alton, Ill. A charter has been applied for and the company will be capitalized at $600,000. The steel plant will have a capacity of 300 tons and three or four 35-ton open-hearth furnaces will be built. The new corporation will be headed by T. S. Clarke, former president and chief owner of the Perry Iron Co., Erie, Pa., which recently was purchased by Pickands, Mather & Co., Cleveland. Other members of the organization are: J. R. Hastings, of the Ohio Steel Foundry Co., Lima, O.; E. J. Anglin, of Pittsburgh, and George Schauwecker, of Sharon, Pa. The company has purchased about 44 acres east of Alton, and about 700 men will be employed. It is announced that the plant will be in operation next June.

Contract for Open Hearth Furnace

The Andrews Steel Co., Newport, Ky., operators of the Newport Rolling Mills, has let the contract to S. R. Smythe & Co., Pittsburgh, for the installation of a new 50-ton open-hearth furnace, which also includes the additional building and equipment. It will be six or eight months before the new furnace will be ready for operation. No new additions to the mills in the form of rolls, etc., will be made at the present time.



NO PROCESS of steel manufacture, introduced during the last half century, aroused as much interest during its early development stages, as that of the electric furnace refining method. In full appreciation of the great interest manifested in this subject, THE IRON TRADE REVIEW has arranged for the publication of a series of articles on this subject, in which every detail of this practice will be fully discussed. All of the practical types of furnaces and the more notable installations will be described, and the economies effected by this process, as well as the quality of the product, will be considered. The first article, published herewith, gives the results of Heroult furnace operations, both in the United States and foreign countries. In succeeding installments the Girod, Stassano, Keller and other well-known types of electric furnaces, will be described and data of the more notable installations, such as cost of operation, quality of product, etc., will be presented. The electric furnace today is not alone adapted to steel works operations, but is being used successfully in many steel casting plants. Malleable founders likewise are investigating the merits of this process for melting iron, while various types are now being built for brass foundry use.

Electric Furnace Methods of Steel Production---I

Wonderful Developments in Recent Years Are Outlined, With Details of Heroult Furnaces at South Chicago and Worcester, Mass.

By John B C Kershaw

In a handbook entitled "The Electric Furnace in Iron and Steel Production", published in London in 1907, the writer stated that, in his opinion, the use of electric furnace methods of steel refining would extend rapidly in all countries possessing a well-developed steel industry, and that these new processes would modify largely the older processes of steel manufacture, when once the experimental stage of their development had been passed. The progress made during the five years that have elapsed since this handbook was published, has proved the truth of the above prophecy, for the output of electrically-refined steel has increased from 30,000 tons in 1908, to 120,000 tons in 1910, and the output for 1911 has been estimated at 165,000 tons.

Rapid Development

Compared with the world's output of steel, these totals are small and insignificant, but when one realizes that only 10 years ago electric steel was largely a novelty, and that the steel manufacturing industry, owing to its age and importance, is one of the most conservative of all trades, the progress made in the period from 1907 to 1912 was quite notable, and considering all the circumstances, remarkably rapid.

Two forecasts made by the writer, relating to the development of electric steel refining, are also now in course of realization. These include the use of the electric furnace for the last stage of the refining process, after charging with molten metal from the Bessemer converter or the open-hearth tilting furnace, and the use of waste blast furnace or coke oven gases for generating the electric energy required for the refining process. At one of the large works owned by the United States Steel Corporation, gas engines using the waste gases of the blast furnaces provide a large portion of the current required for the electric refining furnaces of 2,000 kilowatt capacity, and a similar system of power generation is about to be employed at a large works in England.

In the latter case, coke oven gas is to be used in conjunction with the waste gas from blast furnaces for driving the gas engines, and the whole plant, including rolling mills, blowing engines, auxiliary motors and electric and open-hearth furnaces, will be operated without burning a single ton of solid fuel, especially for either power or heating purposes. According to Campbell the cost of power from this installation will be less than 6 cents per kilowatt-hour and if the plant is well designed and repairs are not unusually heavy, the cost may be 25 per cent below this limit.

Increase in Size of Furnaces

With regard to the advances in other directions, the capacity of the furnaces has been increased five-fold and the power consumption has been reduced 33 per cent in the period under review. In 1907 the Heroult furnaces at La Praz, taking 480 kilowatts and producing 3 tons of metal at one heat, were the largest in actual use, whereas, in 1912, furnaces producing 15 to 25 tons of metal per charge, and consuming 2,000 to 3,000 kilowatts of electrical energy, have been installed both in Germany and in the United States and are yielding good results.

The chief advantage obtained with these large furnaces is that radiation losses per ton of metal refined are reduced, and that a metal possessing more uniform chemical and physical properties can be obtained, than from a succession of small heats. As re-

gards power consumption, the best average results obtained in 1907 were 800 kilowatt-hours per ton (2,000 pounds of metal produced from cold scrap), whereas, the latest returns for a recently-erected refining furnace, show a consumption of only 575 kilowatt-hours under similar conditions of work. The consumption and costs of electrodes also have been reduced 50 per cent during the past five years, by aid of improvements in the method of manufacture and of use. Further economies in this direction may, no doubt, be expected.

Turning now to the field of application for the electric furnace in the steel industry, we find that whereas five years ago, only finer and higher-priced varieties of tool steel and special alloys were being manufactured, today it is being employed for a great variety of products, including steel for axles and tires, gun steel and billets for wire and plates. The application of the electric furnace as a heating medium only in the production of fine castings is extending also, and in Germany, France, England and America, installations of this character are now to be found in operation. The advantage here is, that the high temperature obtained by the electric method of heating enables sharper and denser castings to be obtained.

This extension of the field of application of the electric furnace in the steel industry, from the production of high-class crucible steel, through the intermediate grades of steel to that of rail and structural steel has, in fact, been one of the most striking features of the development of the past five years, and the question now before steelmakers is, can this extension be justified by the practical results, and can the electric process of steel manufacture compete with the ordinary open-hearth process, for ordinary rail and structural steel? On this particular point, opinion at present is sharply divided, and it will only be after the practical test of experience during the next few years that the question will be decided.

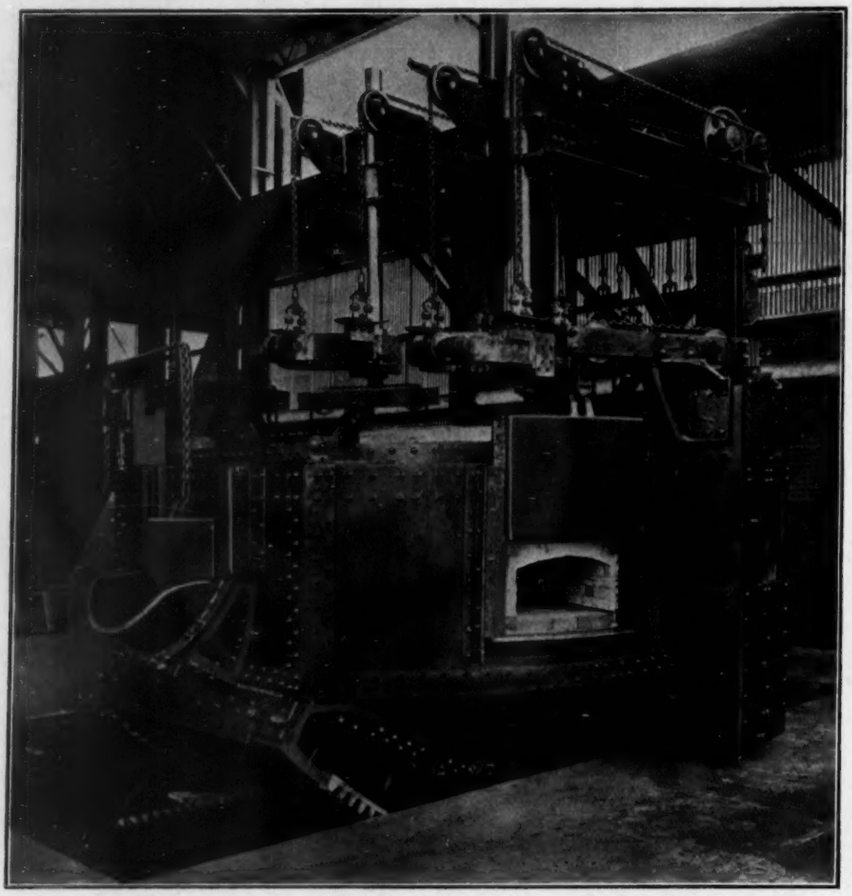


FIG. 1—HEROULT ELECTRIC FURNACE, 15 TONS CAPACITY, INSTALLED AT THE WORCESTER, MASS., PLANT OF THE AMERICAN STEEL & WIRE CO.

In the writer's opinion, the answer will depend upon the four following factors: Cost of power, cost of coke, cost of raw materials and cost of freight for the finished material to the point of consumption. In Norway and Sweden, and possibly in the central districts of Europe, it may be found possible to produce rail and structural steel economically by aid of the electric furnace; in Germany, England and America, under the present conditions, the writer believes that the electrical method of manufacture will be found unable to compete with the open-hearth process for these cheaper classes of steel.

However, whether such an extension of the use of electric furnaces occurs at once in England, or only with the gradual exhaustion of the coal supply in that country, its field of application is already sufficiently wide to justify a more detailed study, on the part of steelmakers, of the developments of the past five years. In a series of articles the writer will give details of the improvements in design and operation which have occurred in connection with each type of furnace during the period under review, and will also present a summary of the contents of the more important papers on the subject that have been contributed to scientific societies and to the technical press, from 1907 to 1912.

The Heroult Furnace

The Heroult electric steel refining furnace, in number of installations, heads the list of electric furnaces in use in the iron and steel industry. Thirty-one furnaces of this type have already been installed with an aggregate capacity of 133 tons per charge, and 20 additional furnaces, with an aggregate capacity of 143 tons per charge, are in course of erection. The increase in the size of the furnaces also is indicated by these totals, since the 31 furnaces in active operation have an average capacity, per charge, of 4.3 tons while the 20 furnaces now being erected have an average capacity of 7.1 tons per charge.

The largest types now in operation are the 15-ton furnaces of the United States Steel Corporation at Worcester, Mass., and South Chicago, Ill. The largest furnaces in course of erection are in Germany. These include one of 25 tons for the Deutscher Kaiser steel works at Bruckhausen, and one of 22 tons for a steel plant at Rombach. The 25-ton furnace is to be operated with molten metal from an open-hearth furnace; presumably it is to be employed for the manufacture of special qualities of rail or structural steel. The furnaces which are operating on cold scrap yield, on the average, four heats

per day of 24 hours, while those taking molten metal yield 15 heats per day. The aggregate daily output of the 31 furnaces in active operation on this basis, is 1,489 tons per day of 24 hours, which will be more than doubled, when the furnaces now in course of erection are placed in service.

The design of the Heroult furnace has undergone little alteration during the 12 years that have elapsed since the first English patent was issued in 1900. This fact proves that Heroult's earlier experience in the manufacture of aluminum and ferro-alloys by the aid of electric heat had been of service to him when the time arrived to design a furnace adapted to the special requirements of the steel industry. Fig. 7 shows the original, 2,500-kilogram furnace with which the first trials were made at La Praz, in 1899-1900, and Figs. 3, 4 and 5 show the 2,500-kilogram furnace which was started in January, 1911, at Baintree, Eng., for Lake & Elliott. The most striking changes included the use of square instead of round electrodes and the location of the charging door at the back, instead of at the side of the furnace.

Design of Heroult Furnace

The Heroult electric furnace consists of a closed, shallow iron tank, thickly lined with refractory materials, mounted upon curved and toothed bars, which permit the furnace to be tilted and held by a rack at any angle for discharging its contents. Magnesite brick and crushed dolomite form the lining for the bottom of the furnace and are employed also for the openings, and for the portions of the furnace exposed to the corroding action of the slags. The top of the furnace is built of silica brick, as this is the portion which suffers most from the high temperature of the furnace operations.

As regards the source of heat, the earlier furnaces of 2,500 kilograms capacity were operated with direct current. Two massive carbon electrodes 68 inches in length and 14 inches square, well-insulated from each other and from the furnace cover, were employed to carry the current into and away from the slag on the charge of metal in the furnace. The carbons were supported by an insulated framework attached to the back of the furnace, and could be moved either in a vertical or horizontal direction by a set of gears.

The method of operating these direct current furnaces was to employ both arc and resistance heating for melting the charge of metal and for the refining operation, the electrodes being raised just clear of the molten slag when the highest temperature was desired. Under these conditions, two arcs were formed, one as the current entered the slag from the first electrode, and another as the current escaped from the slag through the second electrode. The heat of these two arcs and that developed in the slag itself by the passage of the current between the point of ingress and egress, raised the slag to a very high temperature, which was transferred to the metal lying underneath. Both oxidizing and reducing effects would be obtained by varying the composition of the slag. The slag is employed in the Heroult refining process as a scavenging agent; the number of slags required to purify the metal depending upon the amount of impurities in the original charge, and the purpose for which the finished metal is required.

The use of an air blast to produce an oxidizing effect was abandoned very early in the trials of the furnace and the electrodes are never allowed to dip in the slag in present practice. Iron ore is now used to produce an oxidizing slag when this is required. The method of work with the early type of furnace was as follows:

A charge of steel scrap, pig iron, iron ore and lime was placed in the furnace, and this was raised to the melting point by combined arc and resistance heating. The slag formed by the lime and silicates of the ore rose and floated on the surface of the molten metal. The further transfer of heat to the charge occurred by allowing the electrodes to dip just beneath this slag, but not into the metal beneath it. Iron ore was then added to the charge to produce an oxidizing slag. Under these conditions the impurities of the iron and steel scrap became oxidized and entered the slag. By pouring off this slag, therefore, and by renewing, several times, the materials which formed it, a very pure product could be obtained. The method was in reality a washing-out process, in which the slag acted as a solvent. The fact

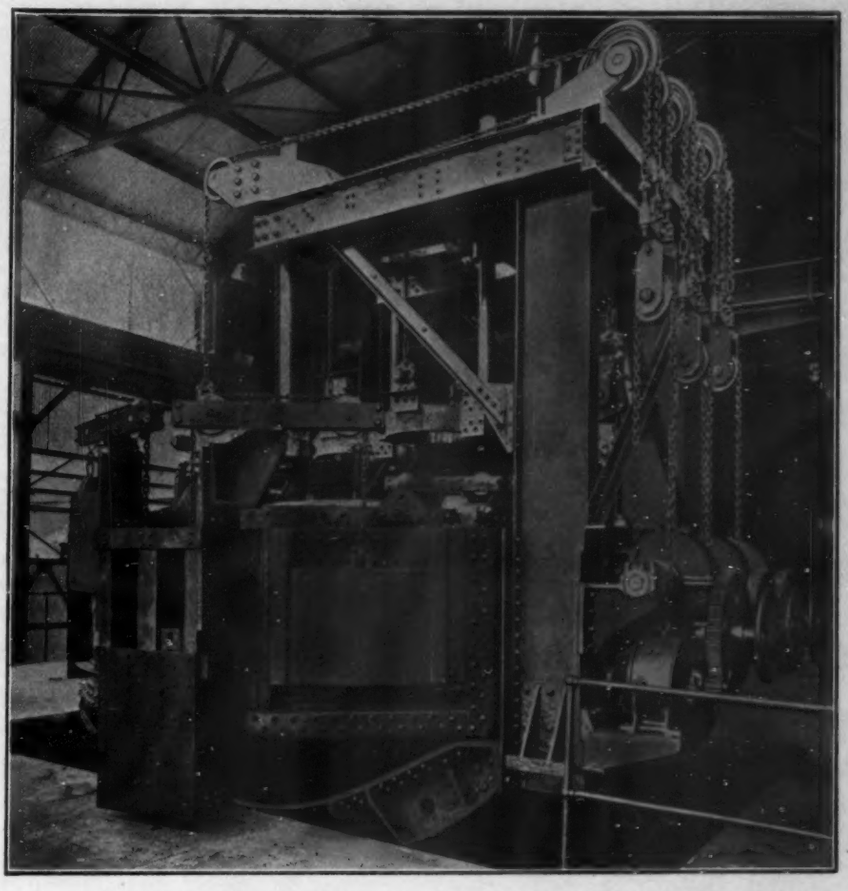


FIG. 2—SIDE AND REAR VIEW OF THE HEROULT FURNACE AT WORCESTER. IN THIS ILLUSTRATION AND IN FIG. 1, THE ELECTRODES ARE NOT IN POSITION.

that all the heating with this type of furnace occurred without any actual contact between the carbon electrodes and the metal, also conduced to the purity of the product, since neither silicon nor carbon could enter into the iron or steel from the electrodes. When the iron in the crucible had been raised to the requisite degree of purity by this washing-out process, a calculated amount of an iron alloy, high in carbon, was added, and the resultant steel, of known carbon content, was poured into the casting ladle.

The 15-Ton Furnace at South Chicago

The following details of the construction and methods of operating the 15-ton furnace installed by the Illinois Steel Co., at South Chicago, are taken from a paper by C. G. Osborne, read before the Chicago section of the American Electro-Chemical Society, in January, 1911. They show that only slight changes have been found necessary in the Heroult furnace, when worked with three-phase in place of direct current, and with charges of metal five times larger than those used in the early furnaces.

Upon a solid foundation, about 5 feet above the ground level, a stationary rack, 8 feet, 9 inches long, is fastened. Upon this rack the furnace proper rests on a floating pinion, fastened to its shell by rivets. The arc of this floating pinion has a radius of 10 feet, and its purpose is to give the furnace an angle of approximately 29 degrees when tilted over to its full extent.

Attached to the back of the furnace is an 18-inch plunger with a 4-foot stroke, working in a cylinder attached to an hydraulic pipe line of 500 pounds pressure to the square inch. This gives a lifting power approximately of 45 tons. The balance of the furnace is so arranged that the equilibrium is never upset, and, therefore, to return to the horizontal position, merely requires the release of the pressure. It will be noted that the floating pinion and rack require some provision for the forward position of the furnace when tilted. This is taken care of by having a movable cylinder pivoted at both the top and bottom, which allows the cylinder to follow the motion of the furnace.

The furnace shell is built of steel plates, 1 inch thick, riveted together. The outside horizontal cross-section plan is approximately that of a complete circle, 13½ feet in diameter, with two flattened portions situated at the front and back, respectively.

On the bottom of the furnace, within the 1-inch plate, and next to it, one row of magnesite brick, laid the 4½-inch way, is placed across the flat portion. The side walls of the furnace are vertical and consist of two rows of magnesite brick, laid lengthwise, giving a thickness of 18 inches of magnesite brick. These solid magnesite brick walls extend up to the furnace roof. The bottom of the furnace consists of dead-burned magnesite to a depth of 12 inches at its thinnest point, which is, of course, at the extreme center. From this thinnest point the bottom slopes gradually upwards so as to form a portion of a sphere 7 feet, 2 inches in radius. The furnace bottom was made as follows: Dead-burned and carefully-ground magnesite was mixed with basic open-hearth slag in the proportion of four of magnesite to one of open-hearth slag. To this mixture, sufficient tar was added to make the mass sufficiently plastic to enable it to be tamped into the furnace. The entire depth of the bottom was tamped in this way. Next, the furnace was filled with wood, dried out for about 48 hours, and then filled with coke, and the electrodes lowered and the current turned on. In this way the bottom was fluxed into place.

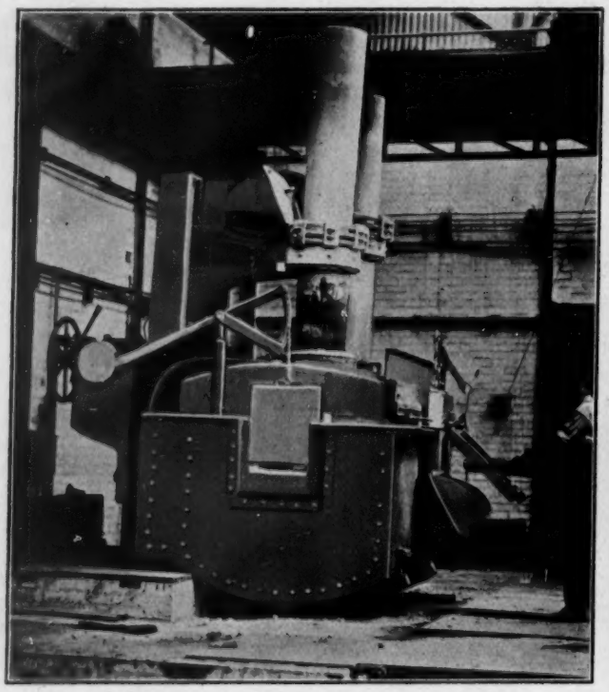


FIG. 3—END VIEW OF LATE TYPE OF HEROULT FURNACE OF 2,500 KILOGRAMS CAPACITY

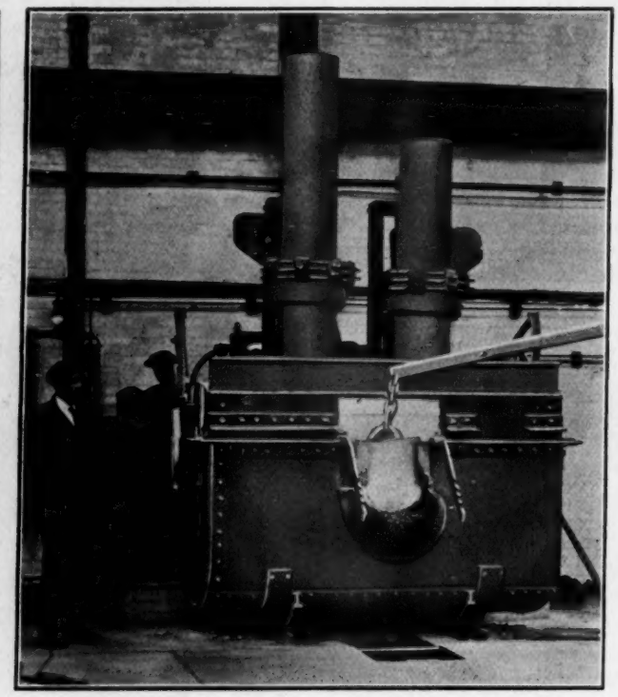


FIG. 4—FRONT VIEW OF 2,500-KILOGRAM, HEROULT FURNACE

The Furnace Roof

The furnace roof is built of silica brick, 12 inches in thickness, and is laid on a movable ring. This ring is provided with a top and bottom angle iron to take a skew-back brick, and from this the arch is spanned across the 10-foot interior of the furnace with an 8-inch rise. The bricks are set in circles parallel to the steel ring, and wooden wedges are provided to take care of the subsequent expansion of the brick. Holes for the electrodes

are left in the roof by means of templates.

There are five doors, two on each side of the furnace, and one in front of the pouring spout. The doors are made of cast iron, lined with clay brick, laid the 4½-inch way. They work in the usual groove arrangement, and are operated by steam pressure of about 150 pounds. The front door over the pouring spout is an exception to this, being operated by hand with a counterbalance.

The three electrodes are lowered through the roof in the form of an equilateral triangle, each side of which is 5 feet 2 inches in length, the apex of this triangle pointing toward the back of the furnace. The center of this triangle coincides with the center of the furnace roof. There are three separate holders, one for each electrode. Each holder is constructed it and the electrode to make a gas-tight joint.

The weight of the electrodes is supported by chains which extend over pulleys to the drums at the back of the furnace. The electrodes are kept in alignment by vertical guides, and are regulated by individual motors placed at the back of the furnace. The regulation may be either by hand, by controllers or by automatic devices.

The operating platform of the furnace is about 9 feet from the ground level. Around the furnace on this platform, at convenient points, bins are placed for the miscellaneous materials used in furnace operations. The front part of the furnace platform is cut out to allow a ladle to be hung in position when the furnace is tapped and for any miscellaneous work in the pit. The pouring platform is 30 feet long, and is of sufficient size to permit eight molds to be placed in position for pouring.

The current is three-phase, 2,200 volts and 25 cycles. The cost for power is ½ cent per kilowatt-hour, as measured at the meters. At the electric furnace it is stepped-down by means of three 750-kilowatt transformers, to the voltage of the furnace. These transformers are so arranged with switches, that the primary turns may be altered to give secondary voltages of 80, 90, 100 or 110 volts as desired. Ordinarily, 90 volts are used.

The normal operation of the furnace is as follows: Ordinary Bessemer iron is full-blown in a 15-ton converter, in from 8 to 12 minutes. It is then poured directly from the Bessemer vessel into an electric furnace transfer ladle, and is drawn to the electric furnace building, a distance of about one-fourth of a mile, in about five minutes. As a precaution against the possible formation of a skull in the ladle, the Bessemer charge is blown about 1,500 pounds of scrap hotter than ordinary Bessemer practice.

When the ladle is received at the electric furnace it is picked up by the crane, slightly tilted and the silicious slag is completely cleaned off by hand-rabbling. The metal is then ready for charging. This is accomplished by tilting the ladle on its trunnions and the metal flows into the furnace through the spout. Cleaning off the slag and charging occupies from five to ten minutes.

The electrodes are then lowered and the current is turned on. As the metal is being poured into the furnace, the helpers shovel iron oxide and lime into the furnace through the working doors. In this way a basic oxidizing slag is produced, which serves to remove the phosphorus. In about 30 minutes this slag has served its purpose, and the furnace is tilted slightly forward and the slag is removed in from five to ten minutes by hand rabbling.

The recarburizer is added at this point. On the bare surface of the oxidized metal, lime is quickly added, with sufficient fluorspar to keep the mass fluid. In about 15 minutes this lime is melted, and finely-divided coke dust is thrown on top of the slag underneath each of the three electrodes.

Under the influence of the arc, cal-

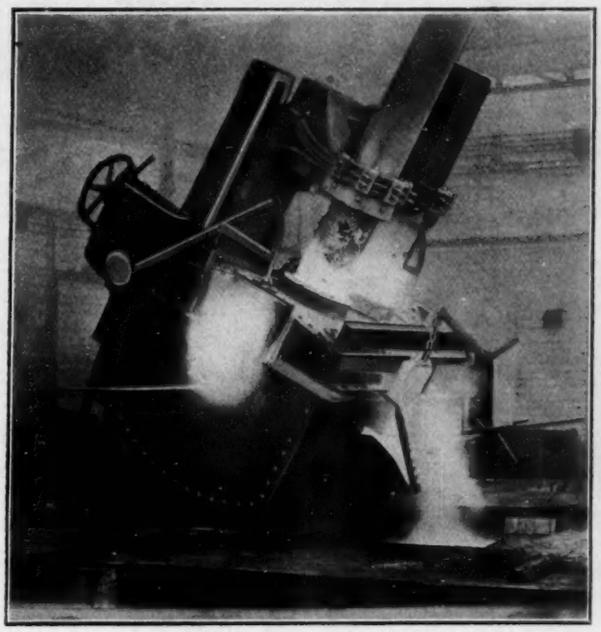


FIG. 5—HEROULT FURNACE AT BAINTREE IN CASTING POSITION

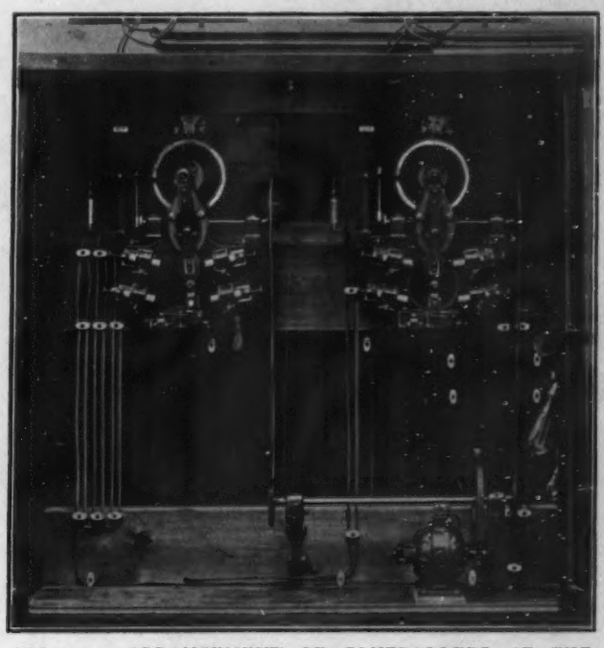


FIG. 6 — ARRANGEMENT OF CONTROLLERS OF THE BAINTREE FURNACE

of a solid, water-cooled copper casting bolted directly to the bus-bar. In front, these holders are split and are joined with a right and left screw, which enables the holder to be opened or closed at will. The holders are designed to carry a 24-inch electrode, but by the aid of contact blocks, any electrode of a smaller size can be employed.

The electrodes in use early in June, 1911, were 14-inch square carbons manufactured by the National Carbon Co., Cleveland, and at the point where the electrode entered the roof of the furnace, a cooling box through which water circulated constantly, was placed round the electrode. This box rested on the roof of the furnace, and movable plates were set in position around

cium carbide is produced in gradually increasing quantities. As soon as this point in the refining operation has been reached, a neutral if not actually a reducing atmosphere has been obtained. From this point to the finish there is practically a dead-melt in a reducing atmosphere. The slag at this stage of the process is fluid and highly basic. If a sample should be taken and water added to it, the resultant acetylene gas, from the well-known calcium carbide and water reaction, is of sufficient quantity to light and burn for half a minute.

Tests are next made to show the condition of the steel. A small, cylindrical test piece is poured and forged to a round pancake shape under a steam hammer, located at the furnace. If this forged sample shows by its appearance, a satisfactory condition of the metal, the bath is tapped. If not, further refining is necessary.

To tap the furnace, the electrodes are raised from the bath and the ladle is swung by a crane underneath the pouring spout and the tilting lever is pulled forward. The pouring is done through a 1¼-inch nozzle to molds of varying sizes. A typical furnace charge sheet is given in Table I.

It will be noted, from Table I, that it takes from 1¼ to 2 hours to make a heat, according to the grade of steel produced.

What is actually done in the electric furnace at the South works of the Illinois Steel Co. is to take oxidized blown metal and to produce deoxidized steel, low in sulphur and phosphorus, and, within reasonable limits, of practically any analysis required by the consumer. The steel charged into the electric furnace has approximately the following analysis: Carbon, 0.05 to 0.1 per cent; sulphur, 0.035 to 0.07 per cent; phosphorus, 0.095 per cent; manganese, 0.05 to 0.1 per cent, and silicon, 0.005 to 0.015 per cent.

The electric furnace at South Chicago has produced high grade alloy steel, high grade and ordinary carbon steels, and has operated on a greater variety of products than any electrically-heated furnace in the world.

As to the mechanical tests of the steel now being made by the Heroult-Bessemer electric process at South Chicago, the following data were given at the mechanical testing plant of the Illinois Steel Co.: Elastic limit, 35,000 to 47,000 pounds per square inch; tensile strength, 60,000 to 70,000 pounds per square inch; elongation, 25 to 30 per cent; reduction of area, 43 to 60 per cent. As to the difference between this electric steel and acid open-hearth steel, it was stated that the same tensile strength is obtained with the electric steel, with lower carbon than with open-hearth steel. For example, a 10 per cent carbon electric steel averages the same tensile strength as a 0.15 to 0.17 carbon acid open-hearth steel.

In the course of the discussion on Mr. Osborne's paper, it was stated that at South Chicago, ferro-silicon is employed in finishing rail steel, but it is not used in an ordinary way for deoxidizing purposes. There was found to be less loss from segregation in the ingot, with electric steel than with open-hearth steel; this was ascribed to its greater density and greater freedom from occluded gases. The furnace required 1,950 kilowatts to operate it. Of this total 750 kilowatts were necessary to maintain the molten, 15-ton charge at the proper temperature for the refining operation, to balance radiation and other heat losses, while the full power was only employed when the charge was being heated. The furnace was not run continuously, and after cooling-down at week ends and at other times, it was prepared on restarting for its charge of molten metal, by the use of coke and an electric current, or by the aid of oil-burners.

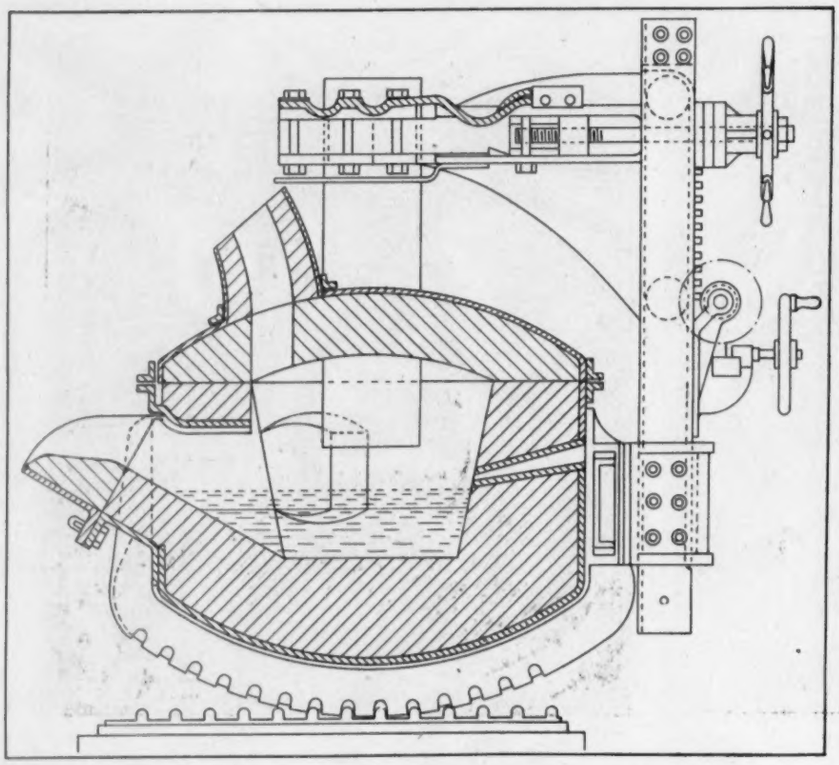


FIG. 7—SECTIONAL ELEVATION OF THE HEROULT ELECTRIC CRUCIBLE FURNACE

Table I.

ELECTRIC FURNACE CHARGE SHEET, ILLINOIS STEEL CO., SOUTH CHICAGO

Material Used.

	Pounds.
Converter-blown metal	30,000
Scale	700
Ferro-manganese, 80 per cent	200
Ferro-silicon, 10 per cent	60
Ferro-silicon, 50 per cent	80
Recarbonizer	130
Fluorspar	400
Coke dust	200
Lime, first slag	600
Lime, second slag	600
Dolomite	400
Magnesite	25

TIME REQUIRED FOR ELECTRIC FURNACE OPERATION

	A. M.
Tapped previous heat	7:00
Metal ordered for	7:15
Metal received	7:15
Began fettling	7:17
Current on	7:27
Slag-off, began	8:00
Slag-off, finished	8:11
Tapped	8:48
Time of heat	1 hour, 21 minutes

Cost of Operation

No cost data are available covering the operation of either the South Chicago or Worcester, 15-ton furnaces, and only a few detailed figures of the power consumption are obtainable. Assuming that the average power used per charge at South Chicago is 1,350 kilowatts and the average time per charge 80 minutes, the results would show 117 kilowatt-hours per ton of 2,000 pounds. In Tables II, III and IV, figures from an article published in *Metallurgical and Chemical Engineering*, April 1910, support this

estimate of the power consumption of the South Chicago furnace, when working under normal conditions, with molten metal from the Bessemer converter. This method of operation

Table II.

TIME REQUIRED FOR VARIOUS HEATS WITH CURRENT CONSUMPTION

Net weight charged, pounds.	Kilowatt hours used.	Time. Hours.	Min'ts.
29,000	2,000	1	20
28,000	2,300	1	35
28 200	2,500	2	15
28,000	2,200	1	30
26,600	2,100	1	15
25,700	2,200	2	40
25,700	2,900	2	..
23,000	2,500	1	35
28,000	2,400	1	35
27,000	2,300	1	25
27,400	2,700	1	45

was patented in the United States on Sept. 14, 1909, by A. R. Walker.

The average specific energy consumption of the nine heats in Table III is 47.2 kilowatt-hours per 1,000 pounds net weight, or 103.8 kilowatt-hours per net metric ton. A comparison of the specification for axle steel and the analyses of the metal from eight heats, is made in Table IV.

The cost of repairs is said to be low and is given by the same writer as follows:

A silica roof costs $60; if it lasts for 129 heats the cost of the roof per ton treated is about 3 cents. The 10 pounds of dolomite ($6 per ton) required for repairing the lining, per ton of steel, cost also about 3 cents. Hence, the total cost of repairs of the furnace proper, is approximately 6 cents per ton, which is a remarkably low figure.

The consumption of electrodes varies from 6 to 10 pounds per ton of steel; this figure applies both to graphite and amorphous carbon.

Data are not available covering the costs of repairs and power consump-

Table III.

AVERAGE SPECIFIC ENERGY CONSUMPTION.

Net weight, pounds.	Kilowatt-hours.	Kilowatt-hours per metric ton.
28,000	1,400	110.0
27,600	1,700	135.5
27,000	1,400	114.1
28,000	1,000	78.5
28,000	1,300	102.1
28,400	1,300	100.8
27,800	1,000	79.2
27,600	1,500	119.5
28,100	1,200	93.9

tion of the 15-ton Heroult furnace installed by the American Steel & Wire Co., at Worcester, Mass., and shown in Figs. 1 and 2. It is known, however, that the furnace, which has been operating since January, 1910, is, in some respects, more easy to work than the Chicago furnace, and that, as it is charged with Talbot open-hearth steel, largely dephosphorized, the time of the heats is shorter and the specific energy consumption is less than that of the earlier furnace. The steel produced at Worcester is used for the manufacture of the finer varieties of wire.

Considerable space has been devoted in this article to a description of the methods of work and results obtained with the South Chicago furnace on account of the size and importance of this installation, and the fuller particulars that are available concerning it. Other specially interesting installations of the Heroult furnace will now be dealt with briefly.

Producing Tool and Gun Steels

At the Richard Lindenburg steel plant, Remscheid Hasten, Germany, two furnaces of 2,500 to 3,000 kilograms capacity are producing tool and gun steels from molten steel,

Table IV.

Axle steel, pounds.	Carbon, per cent	Sulphur, per cent.	Phosphorus, per cent.	M'ng'nese, per cent.
SPECIFICATION	0.35 to 0.45	0.03	0.03	0.37
ANALYSES OF EIGHT HEATS MADE TO THE ABOVE SPECIFICATION.				
30,000	0.45	0.032	0.031	0.49
29,000	0.37	0.028	0.033	0.42
30,000	0.38	0.028	0.026	0.40
30,000	0.35	0.031	0.037	0.38
30,000	0.41	0.030	0.039	0.37
30,000	0.48	0.025	0.032	0.41
30,000	0.42	0.030	0.027	0.44
30,000	0.35	0.030	0.028	0.34

charged from a Wellman tilting open-hearth furnace. According to Eichoff the method of operation at this plant is as follows:

From a Wellman tilting open-hearth furnace 1.5 to 2 tons of liquid steel, partially purified, are cast into the electric furnace, care being taken to hold back the slag. The bath is covered with an oxidizing slag, and the current is turned on. After a lapse of one-half to three-quarters of an hour the slag is carefully drawn off, the clear bath is covered with a certain amount of carbon and a fresh amount of slag, free from oxides, is charged. This slag is melted after 20 minutes, and then through the action of the arc upon the slag, it is thoroughly deoxidized, calcium carbide being formed. In this manner the bath is completely protected against access of air. The charging of the neutral slag cools the bath so much, that the greater part of the protoxide of iron is reduced by the layer of carbon. A certain quantity of manganese ore is also charged with the neutral slag. This, too, is reduced, and destroys the last small balance of the protoxide of iron. When the slag has become quite white, a sample of the steel is taken and its carbon content is determined. Then a mixture of iron and carbon, accurately calculated, is added, and when dissolved, the necessary addition of manganese and of ferro-silicon is made, to produce the desired quality. The steel is then tapped. So far as phosphorus is concerned the analysis of the steel in a well-managed charge, fluctuates between 0.003 and 0.005 per cent, while sulphur ranges from 0.007 to 0.012 per cent. As a rule, carbon, manganese and silicon can be accurately kept within limits of 0.03 to 0.05 per cent.

Elimination of Sulphur

The elimination of the sulphur takes place during the last stage of the process, and seems to be due to the fact that a much more basic slag can be used in the electric process on account of the much higher temperature available. When the steel is taken in a highly oxidized condition from the Wellman furnace it carries only about 0.01 per cent of phosphorus, and may be directly covered with carbon and the neutral slag. This makes it possible to finish a charge in 1¼ hours, with a consumption of power of 200 kilowatt-hours per ton of steel.

The steel produced under these conditions, according to Eichoff, may be kept for hours under a neutral slag without changing its quality, and a part of the heat may be cast and the balance be worked over to another grade, which is of great importance to steel founders. The steel may be allowed, also, to chill, and be melted over again, without affecting its quality.

Electric Steel for Castings

An installation of a different character is that recently completed at the steel foundry of Lake & Elliot, Baintree, Eng., where castings for the automobile trade are the chief specialty. This plant is of special interest, not only because it is at present the only works in England where an electric furnace is being employed solely for foundry work, but also because it is in a district where

cheap power is unobtainable and the company has been compelled to generate its current. The generating plant consists of a gas producer, a Westinghouse gas engine and single phase alternator.

The gas engine is of the vertical, tandem type with 8 cylinders, and has a capacity of 450 horsepower. The alternator has a capacity of 300 kilowatts at 110 volts. The current is single phase, alternating, and the periodicity, 25 cycles per second. This alternator is direct coupled to the gas-engine. The furnace is of two tons capacity, and is of the standard, single phase, Heroult type, using two electrodes. This refining medium, tilted, is illustrated in Fig. 5.

The furnace has been installed on a concrete foundation, 2 feet, 6 inches above the level of the foundry floor. When skimming off the first slag, the center only, of the platform shown in Fig. 5, is raised, and a shallow slag car is run in under the platform. This car, when in position for receiving the slag, rests on a sliding platform, which is pushed back when the furnace is ready for tapping, thus allowing room for the ladle.

Automatic Regulators

The case for the automatic regulators, which are of the Thury type, Fig. 6, and are used for maintaining the arc at a constant length, is built into a wall between the engine room and the foundry, so that they are accessible both to the melter in the foundry, and to the electrician in the engine room.

The furnace is tilted electrically, a 5-horsepower motor being employed. The control of this tilting mechanism is placed immediately in front of the furnace. The method of working the furnace is that regularly employed when melting and refining scrap in a Heroult furnace. The scrap employed is a mixture of horseshoes, castings and foundry scrap, boiler punchings and miscellaneous heavy steel scrap, of small dimensions. The furnace is served by a 5-ton, overhead, electric traveling crane. Steel from the furnace is received in a 2-ton, bottom-teeming ladle, the actual casting being performed through the intermediate use of hand shanks, and, in the case of the larger castings, by direct-pouring from the ladle. By the use of a bottom-teeming ladle, a ready method is obtained of delivering small and intermittent quantities of steel, free from slag, both to shanks and molds.

The steel made is, of course, exclusively dead soft, between 0.10 and 0.15 per cent carbon, with manganese and silicon varying slightly according to the special mechanical properties required. Owing to the refining powers of the electric furnace, the sulphur and phosphorus are extremely low, being together less than 0.03 per cent.

As a result of the absence of sulphur the proportion of cracked castings is reduced to a minimum. Cracking is generally due to contraction over large surfaces. The size, shape and condition of cores will frequently not permit the necessary shrinkage to take place, and this sets up stresses in the steel which are sufficient to cause rupture. For case-hardening, the steel is equal to the best crucible steel of the same carbon content.

Other Heroult Furnace Installations

Furnaces of similar size and capacity have been in operation at Edgar Allen's, at Vickers' Sons &

Table V.

OUTPUT OF ONE 2½-TON HEROULT ELECTRIC FURNACE.

Melting and Refining Scrap Steel with two Slags.

Week ending Dec. 24, 1911.

Hours worked	126
No. of heats	26
Average hours per heat, including all repairs and charging, 4 hours, 51 minutes	
Total weight teemed	140,510 pounds
Shortest heat,	3 hours, 10 minutes
Lowest power consumption per 1,000 kilograms at furnace, 459.2 kilowatt-hours.	
Average power for week at furnace, 528 kilowatt-hours.	
	Per cent.
Percentage of scrap	3
Percentage of clear ingots	93
Oxidation, etc	4

*Maxim, Thomas Firth & Sons, Sheffield, Eng., since 1910, and an 8-ton furnace is now in course of construction at the Vickers' works. At Edgar Allen's, molten steel from an open-hearth furnace is employed for charging the electric refining furnaces, while at Thomas Firth & Sons and Vickers', cold scrap is used.

The most important development of electric furnace work in Great Britain, however, is that at the Skinningrove Iron Co.'s works, at Carlin How, Yorkshire, where a 15-ton Heroult furnace is now in course of erection. This furnace will be operated entirely by electricity generated from the waste gases of a blast furnace and coke-oven plant, and will produce a high quality of rail steel, from metal run into it, from a Talbot melting furnace. The cost of electrical power at this plant is expected to be about 6 cents per kilowatt-hour, or about the same as that of the South Chicago furnace, which is operated by gas power.

As regards the power consumption of the smaller types of Heroult furnaces when melting and refining steel scrap, the figures given in Table V show the work of the 2½-ton experimental plant at La Praz, France, for the week ending Dec. 24, 1911.

The last heat was the 107th made with the same roof, and this was apparently in good condition for 10 more heats. Making allowance for the difference in the time taken to refine each charge of metal, the figures in Table V represent a larger power consumption than was required by the South Chicago furnace, and the economy of installing large furnaces heated by three-phase current, becomes manifest. In order to obtain the higher efficiency and other advantages of three-phase current generators, small furnaces are now being modified and adapted to this method of working, and the Konigliche Ungarische Staatseisenwerke at Diosgyor, Hungary, are installing a 2,000-kilogram furnace of this type. The 8-ton Heroult furnace now being erected at the Vickers works, Sheffield, is also to be of the three-phase type.

Future Development

The future development of the Heroult electric steel refining furnace and process would, therefore, appear likely to be in the direction of utilizing three-phase current for all sizes of furnaces, and where large installations are concerned, of employing metal from open-hearth furnaces, or from the Bessemer converter, as raw material for the electric-refining operation. More than one-half of the large Heroult furnaces now operating are using molten metal from Martin, Wellman or Talbot furnaces for charging purposes, and in time this method of operation is likely to be generally adopted.

Earliest Production of Steel

The first steel produced in this country was probably made in Connecticut in 1728 by Samuel Higley and Joseph Dewey. Crucible steel was first successfully produced in the United States in 1832 at the works of William and John H. Garrard, at Cincinnati. Bessemer steel was first made in this country in September, 1864, by William F. Durfee at an experimental plant at Wyandotte, Mich., and open-hearth steel in 1864 by the New Jersey Steel & Iron Co., at Trenton, N. J.

Novel Type of Blast Furnace Construction[1]

The Design and Construction of Structural Steel Framework Supported by Four Steel Columns for Carrying the Weight of the Entire Furnace

By J E Johnson Jr.

The general construction of blast furnaces has undergone no radical change in more than a generation. When the old style of masonry construction was replaced by the steel shell, the masonry piers were simultaneously replaced by columns never less than 6, and frequently 12 or 16 in number, set under the mantel ring.

The furnace itself has recently been the subject of radical changes; in some cases the thin-lined construction has been adopted for the whole furnace, and in other cases it has been adopted for a zone immediately above the bosh, raising the mantel several feet to make this possible, but still the style of construction with columns set immediately under the mantel has been universally followed.

Disadvantages of Old Style Construction

In spite of the apparent permanence of this type of construction, it is open to grave disadvantages from the operating point of view, which may be briefly outlined as follows:

The bustle pipe is necessarily outside the columns, as the slope of the bosh and size of the crucible are such as to leave but little room inside the columns for the necessary water piping, etc.; consequently, the penstocks have to pass between the columns. Moreover, the hearth jacket requires a diameter but little smaller than the circle of the inside of the columns, and as a result the cooling-water ditch for protection against breakouts is exceedingly limited in width.

Still another result of this construction is less immediately disastrous, but leads eventually to a very serious condition. The space between the base of the columns and the hearth jacket being so small, the whole structure is necessarily set on one foundation and the continual expansion, which all masonry structures undergo from continued heating, gradually pushes the column bases out.

It has seemed to me that it would be possible to avoid these evils by building a framework of structural material strong enough to carry the weight of the whole furnace and to support this on columns set at the corners of this framework, which would throw them so far back from the furnace proper that they would be safe from all danger from breakouts or other accidents, and at the same time would allow room enough around the furnace for necessary access to all parts with great safety, ease, and speed in all necessary work.

When re-designing our furnace, we first laid it out with the idea of using a triangular frame of girders with a column at each angle, and in order to get the girders above the bustle pipe we considered using the thin-lined construction for several feet above the bosh angle and letting the mantle at the top of this thin zone rest directly on the girders. On further consideration, however, there were two features of this design which we did not like. We desired to use the steel bosh jacket construction, cooled by external sprays, which has proven so durable and satisfactory at many plants in the south, and at some in the north, and which avoids entirely the stepped bosh wall, almost as angular and rough as a flight of steps, into which the cooling plate construction soon wears.

In regard to the three-column construction, while it sets the columns back further from the furnace than they come with the four-column type, in the event of a serious accident around the bottom of the furnace, it was conceivable that one column might be sufficiently affected by heat to yield, and with the three-column construction this would throw the whole furnace to the ground.

With the four-column construction, on the other hand, if anchor bolts to hold the structure down to the foundation were used, one column could fail completely and the two adjacent to it would carry the structure with the assistance of the counterweighting action of the column opposite to the one that failed. This, of course, would only be true if the columns were made so strong that any two would carry the structure.

Accordingly, the four-column construction was adopted and the columns were designed to have an ample factor of safety with any two of

FOUR STEEL COLUMNS AND STRUCTURAL STEEL FRAMEWORK FOR CARRYING THE ENTIRE WEIGHT OF THE BLAST FURNACE

[1]From a paper presented at the Cleveland meeting of the American Institute of Mining Engineers.

them supporting the entire weight of the furnace.

To raise the girders above the bustle pipe and at the same time to avoid the high mantel possible only with the thin-lined zone above the top of the bosh, it was necessary to support the shell on the girders by brackets. To reduce the local stresses on the bottom of the shell, due to these brackets, eight of them were used.

It is obvious that the mantel plate would be entirely unsupported except at its outer edge and that it might deflect at the inner edge, owing to the weight of the brickwork, if some provision were not made to prevent this.

The extent to which this action could occur in view of the brick being so firmly supported at the outside by the heavy angle riveted to the shell, is problematical, but it was not desired to take any chances and a cantilever bracket was therefore designed to support the mantel plate from below to within a short distance of its inner edge. The angles which rivet the bracket to the shell continue down below the mantel and support a heavy, vertical plate, the inner end of which projects under the mantel plate, while the outer end is prevented from rising under the weight so applied by heavy angles fastened to it, which pass up outside the girder and take hold of the outer end of the shell bracket. In order to prevent any possibility of deflection of the mantel plate between these brackets, heavy channels were riveted to the inner ends of the cantilevers in such a position that the center of the channel comes as close as desirable to the edge of the mantel plate.

Concrete Piers for Columns

Four independent piers of concrete were provided, as shown in the accompanying illustration, and these were set back at a great distance from the foundation of the hearth of the furnace proper. These piers are at such a distance from the foundation of the hearth and so entirely separated therefrom that it seems impossible there should ever be any transmission of the expansion of the hearth through the soft dirt between the two, which could force the piers out of position.

Brackets were introduced between the top of the column and the bottom of the girder on each corner to prevent any possibility of the columns failing by leaning all in the same direction, circumferentially. Across the corners of the main girders, channels were riveted at top and bottom to form diagonal braces. These were latticed together vertically for greater strength. The girders were so located that the inner edges of their flanges were 4 inches from the shell at the closest point, and the corner braces were put 7 inches from the shell at the closest point, thus leaving plenty of access to the shell for anything that may be necessary, even behind the girders. The brackets are not riveted to the girders either at top or bottom.

The inward thrust at the top of the bracket comes on the seam uniting the bottom and second shell plates and throws this into compression. The proportions of the bracket are such that the inward reaction from each one is relatively slight and the probabilities are that the sheets alone would be able to resist it without deformation, but in order to leave no doubt whatever on this score, a heavy, 6-inch angle was run entirely around inside the shell just at the bottom edge of the second sheet in such a position as to receive the full thrust from the brackets.

Strength of Girders

In regard to the strength of the girders, they were designed to be safe with a low unit-stress, assuming that the weight of the shell, top rigging and top house lining, back lining, bustle pipe, and the entire charge from the hearth to the stock line, were supported on them. This last condition is most unlikely, but it is conceivable that the furnace might become so badly scaffolded just above the tuyeres that the weight of the whole charge would come onto the mantel and so onto the structural work. We, therefore, provided against this contingency in the design.

The general appearance of the furnace in operation is shown in the accompanying illustration. Two men stood shoulder to shoulder as nearly in line as they could be placed between the wicket on the penstock and the nearest column, in order to show the amount of room available. In addition, the tuyere is not in line radially with this column so that the access to the tuyeres is even more unrestricted than would be indicated by a photograph. This could have been made even better than it is, except that the hot blast main was so located as to prevent placing the columns four-square with the line of the tapping hole. The columns are bricked up to a height of 6 feet to prevent any possibility of damage to them by fire. We considered also making provision to keep them filled with waste water for several feet, but this was found not to be necessary. The brick-work surrounding them consists of hard firebrick laid in cement and is almost indestructible.

The accessibility of the furnace for work of any kind is remarkable and I do not think that anyone who had worked around a furnace of this design would ever desire to return to the old type of construction. We had some trouble with the cinder cooler on one occasion since the furnace was blown-in and got quite a little iron into the ditch beneath it. It ran around the furnace a distance of 7 or 8 feet. This would have been sufficient to tie itself behind one or more columns with the old construction and would have been very difficult to get out. As it was, we simply tore down the 4½-inch wall from the outside of the ditch, pulled the chunk away from the hearth jacket, out of the ditch, in one piece and replaced the 4½-inch wall. This accessibility is also a great advantage in working at water pipes, and especially in following these from the cocks on the circle pipe to the cooling member that they supply. The very short and direct connection from the bustle pipe to the tuyeres also is shown.

Objection will probably be made to this construction on the ground of cost, but the great saving in real cost over the standard construction is one of the features which pleased us most. The first cost of the four-column construction was less than $2,000 in excess of that of the standard construction, but of this saving about $1,000 would have been wiped out by the cost of work on the bustle pipe had we adopted the old construction.

Saving in Time Effected

When the steel bosh jacket is used with the ordinary type of furnace, it has necessarily to be fitted-up and riveted together in several sections inside the columns, and, in fact, it is commonly attached to the edge of the mantel ring, as it is put togther with the necessity of a great deal of fitting of the vertical seams. In the present instance the bosh jacket was built entirely independent of the furnace and when the construction had advanced far enough to receive it, it was simply shoved in through the columns, hoisted into position and riveted, the entire job taking only about two days as against two or three weeks that would have been required had it been built-up in place in the customary way.

We consider that we made easily a saving of five weeks by this type of construction. The loss of profits,

overhead charges, etc., at such a plant cannot be estimated at less than $500 a day, and this saving of 35 days, therefore, represents a saving of $17,500, or deducting $1,000 for the excess cost over the standard construction, a net saving by the use of this construction of $16,500.

It is customary to regard charcoal furnaces as insignificant in size, but this furnace is 60 feet high and of a size that would make from 200 to 300 tons per day with moderate driving on coke iron. Furnaces have such an enormous capacity for exerting destructive energy that the tendency in the minds familiar with them is to overestimate their actual weight. It is doubtful if the weight of a large coke furnace figured on the basis described would exceed 2,000 tons, and there is no difficulty whatever in carrying a load of this amount with a construction of this kind.

Adaptable to Thin-Lined Furnaces

It may be well to point out that the construction lends itself particularly well to the thin-lined type of furnace, because the weight of the lining in such a furnace is an insignificant fraction of that of a standard, thick lining, and because some outside structure is generally necessary for supporting the platforms, spray apparatus, etc., even if not the furnace top proper. This can all be done with great advantage from the girder frame if the type of construction here described be used.

It is well to point out also that if the cooling plate construction of the hearth is used so as to form an adequate support for a thin lining in the zone immediately above the bosh, then the high mantel, which results from that construction, may be directly supported on the girders.

Conclusions

A furnace designed on the plan described is not only feasible, but a safe and substantial construction.

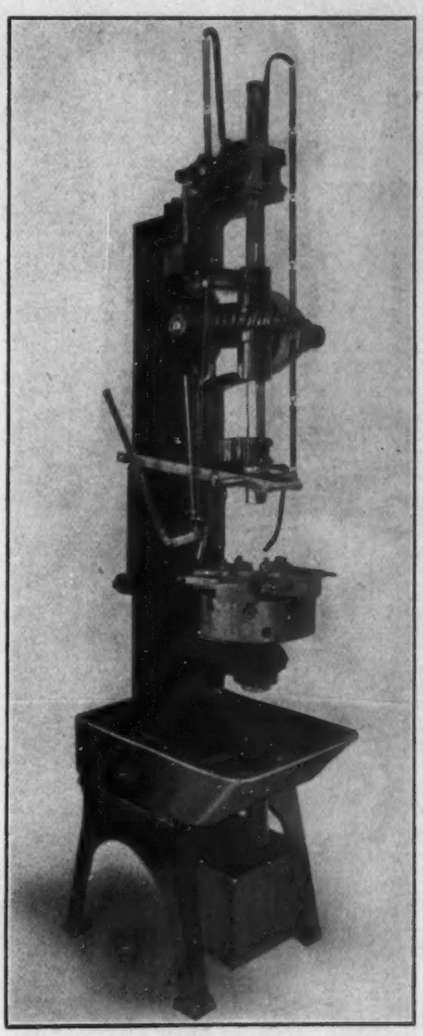
This construction is especially well-adapted to the thin-lined, or partly thin-lined furnace.

Its convenience in operation is so much greater than that of the older type of furnace that there is no comparison from an operating point of view.

The time to be saved by the use of this construction, at least in rebuilding, is so great as to constitute a money-saving of far greater extent than the slight excess cost of this construction over the standard.

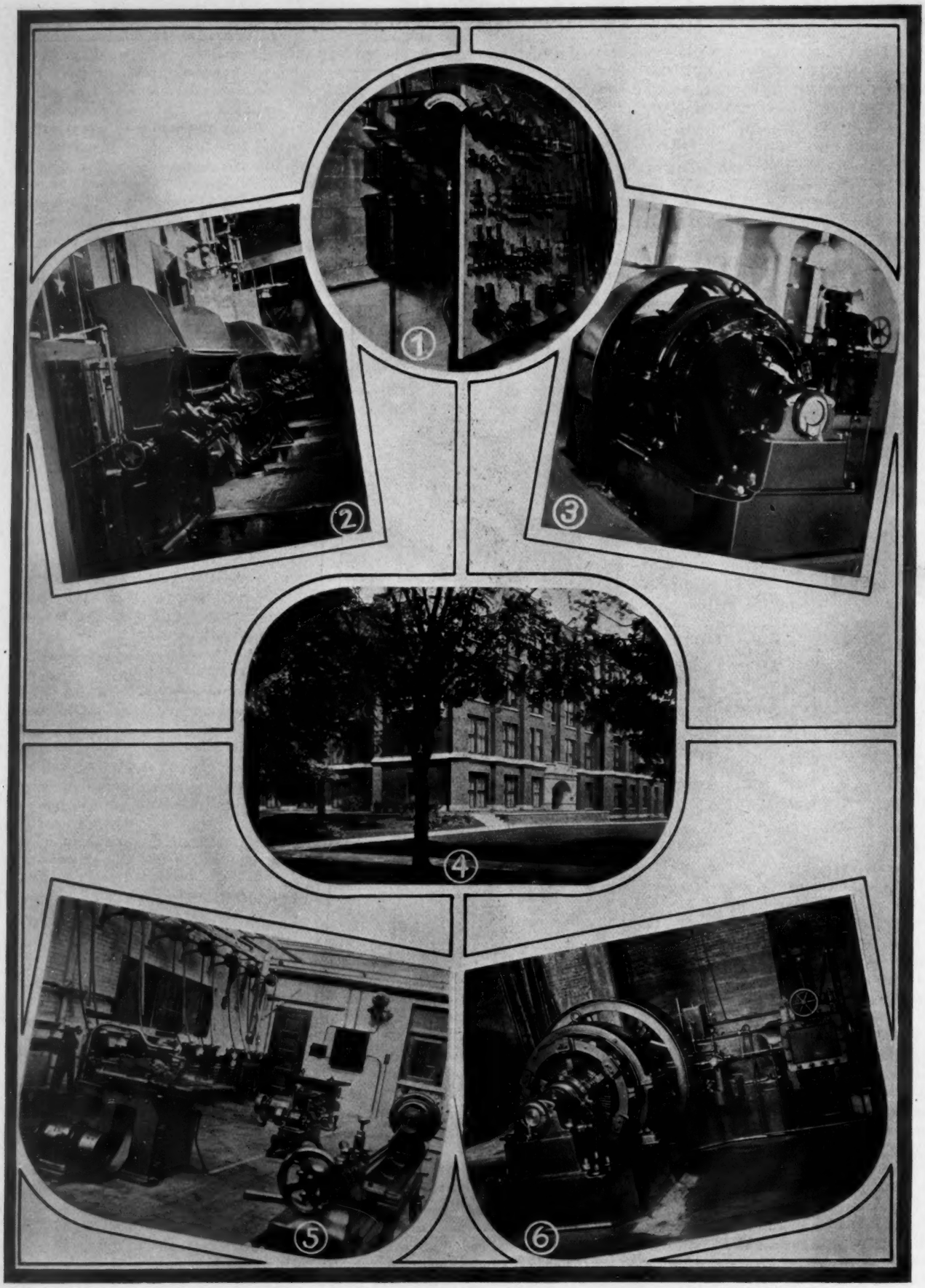
Upright Threading Machine

A new design of upright machine for threading taps is now being manufactured by the Bickford Machine Co., Greenfield, Mass. It consists of a vertical column supported by short legs which also carry a pan for oil and chips. At the base of this column projects a foot which supports the die head. Above this are bearings carrying the vertical spindle, which is 2 inches in diameter. This spindle is driven by a worm and gear of coarse pitch and gives a ratio of about 10 to 1. The worm is located on a horizontal shaft near the top of the machine and carries a cone pulley for a 3-inch belt. The upper end of the spindle carries the threaded shells or lead screws, which are forced down by half nuts, operated in a slide that forms a part of the main column. The lower end of the spindle has a holder to drive the tap which drops through the base of the machine. The spindle also carries, but does not revolve a horizontal bar, to which is attached pulling strings from above. These return the spindle to its normal position when the nuts are released from the lead screw by means of a trip which is set to act the moment the tap drops from its holder. In operating the machine, the square shank of the tap is inserted in the driving dog in the lower end of the spindle while the machine is running. The tap is held to position with one hand, while the short cross handle in front is grasped by the other hand and the tap and spindle are pulled down until the tap enters the die, where it is left free. With the same hand the lever, with a chain attached to its short arm, is then pulled over and this operation locks the half nuts over the lead screw. The lower bearing for the spindle is readily removed and in this way a much longer travel is obtained, which is desirable for set bolts or other taps having long threads. The lead screws and nuts are easily changed for the different pitches. If desired, they are made with an increased lead, to compensate for shrinkage in the hardening of the taps. The capacity of the machine is from ½ inch to 2 inches and the same set of chasers may be used on any size of tap taking the same pitch or thread. The height of the machine is 8 feet, 4 inches and the weight, 1,300 pounds. A pump at the rear, driven from the countershaft, supplies the work with oil. The die head used is of the solid, adjustable type. A four-jaw, combination-geared, scroll chuck, 10½ inches in size, is fitted with special jaws or chaser holders, which carry mill chasers of the same type used in the smaller open dies. The chasers are dovetailed and clamped and are backed lengthwise by screws. The chasers are adjusted separately or can be operated together and are securely clamped to the bottom of the chuck when in position.



UPRIGHT THREADING MACHINE

A considerable amount of vanadium ore is being mined in Colorado, principally from the Paradox district. The principal shippers are the International Vanadium Co., controlled by George D. Blackwell Sons & Co., Liverpool, who have taken over the management of the General Vanadium Co.; Standard Chemical Co., controlled by the American Vanadium Co., and the J. M. Flannery interests, Pittsburgh; A. M. Wilson, of Telluride, Colo., and the Primos Chemical Co. The carnotite ore in this district contains more vanadium than uranium, but the opposite is true of the carnotite ore found in Utah.



VIEWS OF THE MOTOR-DRIVEN MACHINES AND ELECTRICAL EQUIPMENT IN THE MANUAL TRAINING SCHOOLS AT GRAND RAPIDS, MICH.

Electric Motor Drives in Manual Training Work

Description of the Individual Motor and Group Drives at the Central and Union High Schools, Grand Rapids, Mich.

The Central and Union high schools, Grand Rapids, Mich., recently have installed motors for driving the machines in the manual training departments of those schools, and these installations constitute good examples of what can be accomplished with motors in such work. Each school has its own generating plant for the manual training work which, in itself, is an interesting feature. The wood-turning room of the Central high school is shown in Fig. 5. In this instance the wood-turning lathes are driven by one motor from a line shaft, but all the other machines have individual motors arranged for belt drive. The other manual training departments include the bench and preparation rooms, and the horsepower in motors installed in this school is divided as follows:

	Horsepower.
Bench room, four machines, direct motor-driven	11
Wood-turning room, six machines	19
Preparation room, one machine	3

From these figures, it will be noted that there are 11 motor-driven machines with a total of 33 horsepower; in addition there are also 20 horsepower of motors for group drive. The shops accommodate 160 pupils per day.

Power Plant

The plant that generates the power for the manual training department is situated in the basement in the rear of the building. The engine room, shown in Fig. 6, contains a Westinghouse, direct current, three-wire generator, direct-connected to an automatic cut-off, Ball engine. The generator is of the commutating-pole type, with a capacity of 75 kilowatts, operating with from 125 to 250 volts, 300 amperes, and at 275 revolutions per minute. In connection with the three-wire system, two Westinghouse 1.33 kilowatt balance coils are used, to care for any unbalancing that might take place in the system.

A four-panel switchboard, Fig. 1, mounted on an angle-iron frame, controls the power generated. The panel shown at the extreme left in the illustration, is the generator panel, and this has two Westinghouse, 500-ampere, direct current ammeters; one Westinghouse 300-volt, direct current voltmeter; one field rheostat; two generator switches and an equalizer switch. This panel is capable of handling two generators, although at present it is handling only one. Panels Nos. 2 and 3 are fed from the municipal plant and the power from this plant is also used for lighting the building, 70 kilowatts being required for the latter purpose. The fourth panel is connected to the mains of the Grand Rapids-Muskegon Power Co., and this power is used generally to drive a sump motor in the boiler room, also an attic motor for ventilating purposes. An emergency connection is so arranged that power for lighting may be supplied by the Grand Rapids-Muskegon company, and all wiring in the building is in conduits.

The boiler room contains an extensive equipment. This includes three Wickes, horizontal water-tube, 225-horsepower boilers, with Roney stokers, Cochrane feed-water heater, feed pump and a pressure-raising pump. The school is situated in one of the best residential sections of the city, and smoke from the plant is not permissible. This places exacting conditions upon the Roney stokers. Poor slack coal is used for fuel, which makes it still more important that the stokers prevent smoking as much as possible. A large brick stack provides draft and keeps the smoke below the point where it becomes a nuisance. The direct current generator handles its load easily and is said to operate with considerable economy in steam consumption, and with a small amount of lubricating oil.

Union High School

An installation similar to that in the Central high school has been made in the Union high school, in the same city, but the shops at the latter are more extensive and include bench, wood-turning, preparation, machine and forge shops. For this reason more motors have been installed here, the total capacity aggregating 101½ horsepower, divided as follows:

	Horsepower.
Bench room, six motor-driven machines	17
Wood-turning room, seven machines	23
Preparation room, three machines	11
Machine shop, five machines	12½
Forge shop, four machines	20½

The equipment here includes 26 motor-driven machines, with a total of 84 horsepower, and 17½ horsepower in motors for group-driven machinery. These shops can accommodate 320 pupils per day. The power for these motors is supplied by one Westinghouse, 75-kilowatt, three-wire generator, direct-connected to an 18 x 14-inch Ball engine. The stoker, boiler and switchboard equipments are similar to those in the Central high school. Fig. 2, showing the boiler room at the Central high school, gives a good view of the Roney stoker installation, and Fig. 4 is a view of the exterior of the Central high school. Fig. 3 shows the engine room at the Union high school.

United States Steel Corporation Will Install 36-Inch Slabbing Mill at Gary

The Indiana Steel Co. has recently placed a contract with the Mesta Machine Co., Pittsburgh, for a 36-inch slabbing mill for the Gary plant. The mill will be driven by reversing steam engines, and the steam will be produced in waste heat boilers connected with the open-hearth furnace. No additional power generating capacity will be required and there will be no increase in the fuel consumption due to this method of making steam.

The new mill will be operated in connection with the 60-inch universal plate mill, which was described in THE IRON TRADE REVIEW, June 22, 1911. The plate mill is designed to roll universal plates from 13 to 60 inches wide and down to ¼ inch in thickness from slab ingots approximately 6 inches thick, weighing about 1½ tons each. The operation of the mill on this basis has been entirely satisfactory, the output being about 10,000 tons per month. The new slabbing mill will, however, relieve the plate mill from the necessity of performing the heavy break-down work. The slabbing mill will take ingots of the largest size, weighing up to 15 tons and will roll them into regular plate slabs, about 2 inches thick. With the two mills operating together in this manner, it is estimated that the universal plate capacity for the plant will be increased from 10,000 to 15,000 tons per month, or 50 per cent.

The new mill will be located north of and parallel to the universal plate

mill. The soaking pits for the new slabbing mill will form simply an extension to the pits already installed for the rail mill and billet mill. The waste heat boilers, which will be installed in connection with the open-hearth furnaces will probably be placed in No. 3 and No. 4 open-hearth units. Construction work on the new mill has just been commenced and it is expected that it will be completed some time in July, 1913.

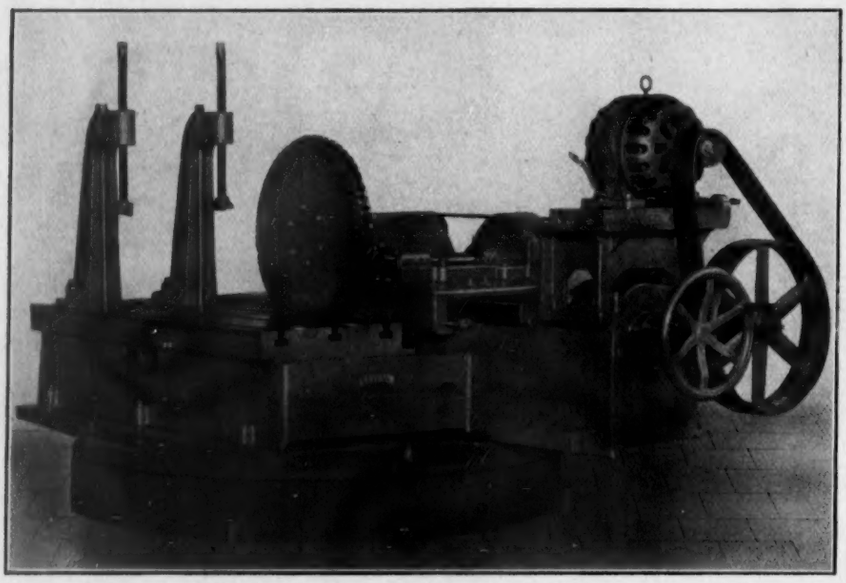
The demand for plates in the Chicago territory has increased enormously during the past two years due especially to extensive car building operations which are now carried on in the west. The mills are so congested at present that it is very difficult to obtain promises of delivery during the first half of 1913. In fact the steel producers have sufficient plate tonnage on their books to run well into the latter part of next year, and unless there is an abrupt change in business conditions, the additional capacity at Gary will give welcome relief. The plate capacity of the Chicago district is now approximately 430,000 tons per year. With the new slabbing mill in operation this will be increased to 490,000 tons.

The advent of tungsten-steel tools, according to F. L. Hess, Mineral Resources, 1910, has saved hundreds of millions of dollars in the United States alone, by the increased efficiency of over 400 per cent in metal-cutting lathes. It is stated that a certain automobile company would be obliged to add $200 to the price of each machine now manufactured, if it were necessary to use the old carbon steel tools instead of the tungsten-steel tools that it now employs.

Combination Saw and Rotary Planer

The accompanying illustration shows a combination saw and rotary planer, recently placed on the market by the Vulcan Engineering Sales Co., Chicago. A large machine of this type has been installed in the shop of the Northwest Steel Co., Portland, Ore. The saw blade or cutter head is not clamped directly to the arbor. Instead, it is provided with a peripheral drive, a sprocket on the arbor engaging the backs of the saw teeth. This is the principal feature of the machine.

The base of the machine is circular which permits cutting long pieces from any angle in the shop. The feed is of the adjustable, variable type and may be operated at speeds from ¼ to 1 inch per minute. It can be changed while the machine is in operation. The motion is transmitted to the feed screw through a clutch, which can be disengaged, allowing adjustment of the carriage by hand.



COMBINATION SAW AND ROTARY PLANER

The milling head may be removed and replaced by a saw blade. The sprocket arbor which drives the milling head or saw blade from its periphery, is adjustable forward to allow for 5-inch wear on the diameter of the saw. This avoids the employment of larger or additional sprockets when the blades are cut down. The saw arbor is adjustable to take up wear. Suitable clamps are furnished for various kinds of work and a V-block, cast in the end of the upper slide, is used in clamping rounds or squares.

The machine is provided with an adjustable stop to arrest the carriage at any point. It is claimed that the substitution of belt drive in place of gear and pinion connection, prevents accidents in case the blade becomes stuck in the work. It is also claimed that the periphery type of machine, the blade being driven by a sprocket engaging the back of the saw teeth, permits the use of a much larger diameter than the plain arbor drive. In the latter case about one-third of the diameter is occupied by the driving collars.

The machine illustrated carries a saw, 31¼ inches in diameter or a milling head, 28¾ inches in diameter. The saw blade carriage has a travel of 36 inches, the blade running about 28 revolutions per minute. The capacity of the machine includes 12-inch rounds, 10¾-inch squares and 24-inch I-beams.

The Use of Gas Lamps

During recent years there has been an increasing use of high-candlepower incandescent gas lamps, especially in those localities where gas is obtainable at comparatively low rates, such as natural gas districts. The use of these lamps, however, has been confined more particularly to stores and street lighting. The Royal Lamp Co., Cleveland, is now making a line of lamps adapted for use in manufacturing plants, mills, foundries, etc., and in many other places where gas lamps have heretofore been considered inapplicable. Some of the features of these lamps are: Glass enamel draft, inducer and reflector, no parts to burn out and individual regulator. They are also made insect proof and it is claimed that there is nothing on the lamps to clean except the globes. Statistics are said to show that the yearly breakage of glassware is less than one globe for 10 lamps in 100, and that with 100 lamps burning five hours per day, mantle renewals are less than one mantel per month per lamp. A 4-burner Royal lamp that develops a 500-candlepower light consumes approximately 10 feet of gas per hour. These lamps are made with or without horizontal shades, with various sizes of globes and the standard burner tips fit any standard make of inverted mantles.

The Riehle Bros. Testing Machine Co., Philadelphia, recently shipped the largest screw power testing machine in the world, which has a capacity of 1,000,000 pounds on two screws, to the Alliance, O., plant of the American Steel Foundries.

Rotary Gas Producers for Steel Plant Service

Description of the Chapman Gas Generating Machine Which Embodies Novel Features of Design and Construction

A radically new type of rotary gas producer, designed by W. B. Chapman, 11 Broadway, New York City, is now being built by the C. & G. Cooper Co., Mt. Vernon, O. This producer, which is shown in the accompanying illustrations, performs three distinct operations, one for each of the three steps necessary in the process of making producer gas, as follows: Mechanically feeding and spreading the fuel; mechanical agitation of the entire fire bed and the mechanical removal of the ash.

The mechanical feed employed has no mechanical parts. Another feature of this producer is that fine and coarse coal are handled simultaneously without separating the coarse from the fine. Some types of mechanical feeding devices are provided with a spout or bell from which the fine fuel falls into the center of the producer and the coarse fuel is projected from the spout with sufficient force to carry it to the walls. This results in a separation of the fuel in the fire bed, to the detriment of the operation of the producer. In the Chapman feed the fuel chamber is stationary and has no bottom. Its capacity is 1,000 pounds of coal, enough to last for half an hour. The lower edge is water-cooled and as the revolving fire bed comes under the chamber, a fresh supply of fuel is spread over the surface, thus constantly keeping the level of the fire bed up to the bottom of the fuel chamber. The lower edge of the fuel chamber is beveled so as to produce a down-stroking effect upon the fire bed, as it passes under it, thereby rubbing in the fresh fuel.

Feeding the Coal

It is claimed that the theory is wrong that coal should be fed uniformly to a gas producer and, on the contrary, it is said that it should be fed unevenly, because when holes and crevices start to form in the surface of the fire bed, more coal is required at these points than elsewhere. The feed in this producer acts on this principle and feeds the coal unevenly, as conditions require. The fuel chamber also prevents a rush of soot into the flues each time fresh fuel is charged into the producer. The tarry gas first given off from the coal in the fuel chamber must pass down through the hotter fire at the bottom of the chamber before it can escape to the flue. This reduces the amount of tarry smoke in the gas. The Illinois Steel Co. made a continuous test of this feed at its South Chicago works during August, 1911. As compared with the operation of the hand-poked producers at this plant, the test showed the following results:

(1) An increase of 19.1 per cent in the strength of the gas.

(2) A decrease of 42 per cent in the quantity of steam required per ton of coal gasified.

(3) The elimination of 83 per cent of the soot deposited in the flues.

Another feature of the machine is the method used for agitating the fire bed. The Chapman company found some time ago that the best method of agitating a gas producer is to revolve one-half of the fire bed over the other half, thus setting up a shearing and twisting action throughout the entire bed. The producer is divided horizontally through the hot zone into a lower and upper section, and the two sections are made to revolve in the same direction but at different speeds. Each section of the wall carries with it that section of the fuel bed which it surrounds. In this way the maximum agitation is produced through the hot zone where it is most needed, and without the use of an agitating member. Agitating arms or beams are said to be limited in their action to a comparatively small portion of the fire bed at any given time.

One of the chief difficulties in manufacturing producer gas is the prevention of clinkers, which are caused by excessively hot spots in the fire bed. The hot spots are caused by uneven spreading of the coal; uneven agitation of the fire bed; uneven distribution of the air blast, and uneven removal of the ashes. Uneven conditions in a producer make blow-holes

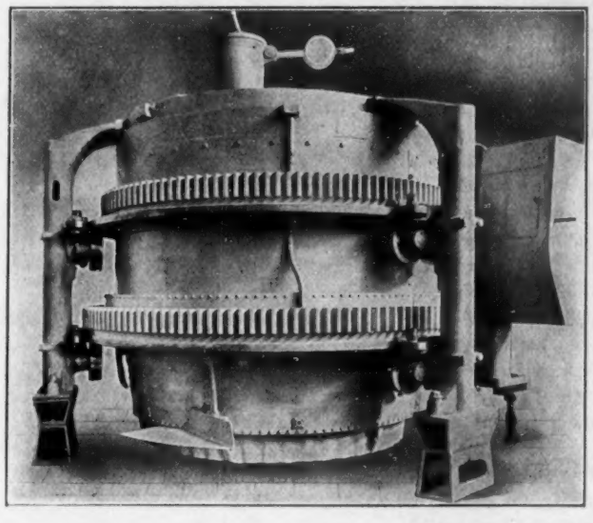


FIG. 1—CHAPMAN ROTARY GAS PRODUCER

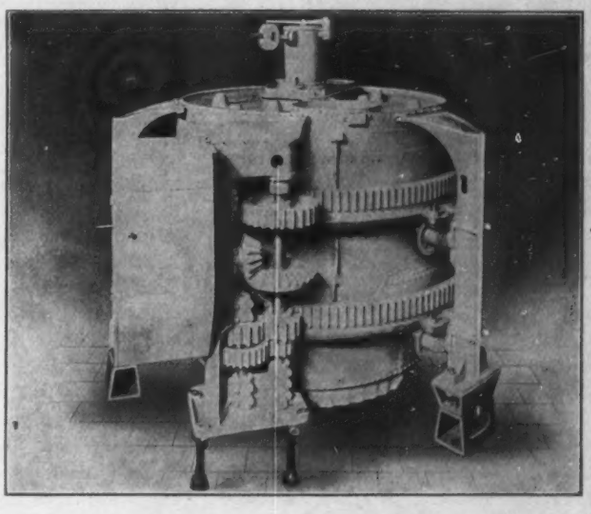


FIG. 2—ROTARY GAS PRODUCER, SHOWING DRIVING MECHANISM

or chimneys in the fire bed. If left alone these holes rapidly become larger, and the temperature about them increases until the fusing point of the ash is reached. Clinkers then start to form about each of these hot spots, and when once formed, it is somewhat difficult to remove them. If the excessively hot spots are avoided, and the uneven conditions prevented, it is said there will be no clinkers. In the Chapman producer the twisting of the upper half of the fire bed over the lower half shears off the holes as fast as they form. This action, together with the fuel spreader and continuous ash removal, is said to prevent effectually the formation of clinkers.

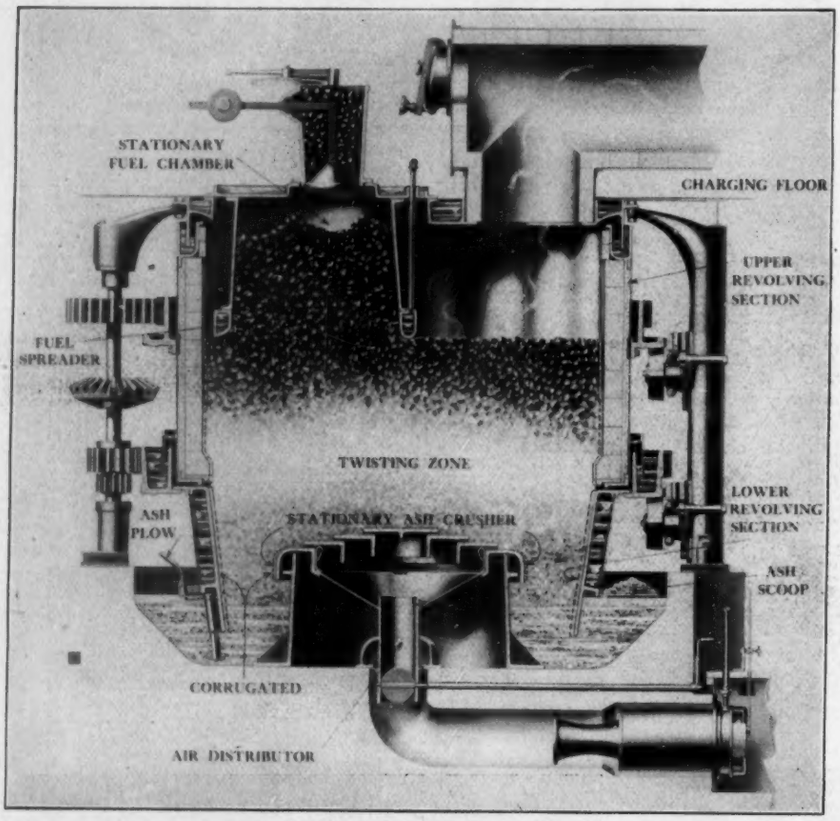


FIG. 3—SECTIONAL VIEW OF THE CHAPMAN ROTARY GAS PRODUCER

This freedom from blow-holes is shown by the unusually low temperature of the gas, about 1,200 degrees Fahr., and by the lack of soot. The amount of the latter is so low that a contract was recently entered into by the company, whereby it was guaranteed that an installation of three producers would operate continuously for two months without requiring a shut-down for flue cleaning.

The removal of ashes from the producer is accomplished in a novel manner. The ashes are first ground between the sides of the stationary, corrugated air box or ash crusher, and the revolving corrugated wall of the lower section. In mechanical producers, the crushing of the ashes is necessarily preliminary to their removal, as otherwise an occasional large chunk would block the operation. After crushing, the ashes are forced up to the top of the ash pan by three adjustable ash plows, which are kept in continual operation, and are easily adjusted when occasion requires. As fast as the ashes are lifted to the surface of the water in the ash pan, they are automatically scooped up and carried to the required point for automatic discharge. The fact that the ashes are removed upward instead of downward effects a saving of several feet in the height required for the gas house and foundation. This continual removal of ashes is said to overcome a number of difficulties associated with the usual mechanical, intermittent removal. As a result of these various innovations, this producer, it is stated, can gasify one ton of coal per hour. In a two weeks' test at the Consolidated works of the American Steel & Wire Co., Cleveland, the greatest amount of variation in the gas made by Chapman producers, was about 2½ per cent. The average result of a two weeks' test on three producers at this plant, in April, 1912, showed the following gas: Combustible, 42.22; B. T. U., 150.8; CO_2, 6.54; CO, 21.91; H, 17.1; CH, 2.70, and N, 50.90. The greatest variation from the average of 150.8 B. T. U. was 2.54 per cent, the poorest gas having 147.34 B. T. U. and the best 154.6 B. T. U. A producer has been in operation at the plant of the Youngstown Sheet & Tube Co., Youngstown, O., for nearly two years, during which time the CO_2 has averaged between 4 and 7 per cent, and the CO between 20 and 25 per cent, while the B. T. U.'s have kept close to 160. The Brier Hill Steel Co., Youngstown, recently ordered 22 of these producers for its new open-hearth furnaces and soaking pits.

In the construction of these machines, the supporting rollers run on high carbon steel pins, are provided with brass bushings, and are cast in a chill and ground. Separate rollers are used to take the side thrust; all rollers are mounted in pairs, set in equalizing yokes and all bearings are provided with large oil wells filled with waste. Steel castings are used extensively in the construction of the gears and other parts.

Lead Breaks Record

The final figures of lead production in the United States in 1911, issued by the United States geological survey, show an output of 486,976 short tons of refined lead, which is 16,596 tons ahead of the best preceding record—that of 1910. Missouri was the largest producer, furnishing nearly 45 per cent of the domestic pig lead. The growth of the lead industry in the United States in recent years has been continuous and rapid, as is shown by the following figures:

PRODUCTION OF REFINED LEAD IN THE UNITED STATES, 1880-1912.

	Short tons.
1880	97,825
1890	161,754
1900	377,679
1910	470,380
1911	486,976

The total production of lead since the beginning of mining has been 10,040,704 tons. In 1911 the gain in lead production was made wholly by domestic lead, the output of foreign lead smelted or refined in this country having decreased 14,419 tons.

An automobile concern using vanadium in cylinders is said to have found that the percentage of loss has been reduced from 6 per cent to 1 4-10 per cent and that the tensile strength has been increased 15 per cent and the hardness, by Brinell test, 18 per cent. The service performance of these vanadium cylinders is said to be making a better record than those previously made without vanadium.

Meeting of the Institute of Mining Engineers

Report of the Proceedings of the Cleveland Gathering Which Was Devoted Largely to the Consideration of Iron and Steel Topics

Although devoted largely to the consideration of papers relating to iron and steel manufacture, the 103d meeting of the American Institute of Mining Engineers, held at the Statler hotel, Cleveland, Oct. 29 to 31, was well attended. The papers and reports presented for discussion aggregated a total of 50, and, owing to the fact that there were only three technical sessions, many excellent papers necessarily were read only by title. One session was devoted to a discussion of the revised constitution and by-laws, which will be presented for final adoption at a future meeting. The interest manifested in the proposed changes in the conduct of the society's affairs foreshadows a satisfactory adjustment of trifling existing differences and there is every indication that the future accomplishments of this great organization will surpass the notable achievements which mark its history and are spread over a period of more than 30 years.

Titanium and Cast Iron

Following the discussion of Capt. Robert W. Hunt's paper, at the opening session Tuesday morning, which described a more thorough system of rail inspection, as noted on page 812 of the Oct. 31 issue of THE IRON TRADE REVIEW, Bradley Stoughton presented a paper entitled "Notes on Titanium and the Cleansing Effect of Titanium on Cast Iron." It was stated by the author that titanium reduces the chill and it was asked, that if this is the case, what reason could be given for using titanium as an addition to car wheel mixtures. In reply, Mr. Stoughton said that it is true that titanium reduces the chill, but in making such mixtures in which titanium is to be used, a change must be made in the silicon and manganese contents. Where this has been done, particularly in the manufacture of rolls and cast iron car wheels, the chill is harder and the metal in the body of the castings is stronger. The percentage of manganese is increased to counteract the effect of titanium to throw out graphite. President Kemp said that titaniferous ores have been located in great abundance in many states and if a method can be devised for using them they will greatly add to the ore resources of the country. One of the peculiarities of some of these deposits is that vanadium is also found in these titaniferous ores. It was stated that the melting point of titanium is not nearly so high as generally supposed, and it has been found to be approximately 1,800 degrees Cent.

Cuyuna Iron Ore

"The Iron Ores of the South Range of the Cuyuna District of Minnesota" was the subject of a joint paper prepared by Carl Zapffe and W. A. Barrows Jr. It was stated that explorations already made indicate deposits aggregating 110,000,000 tons of iron ore on this range, analyzing slightly below 50 per cent iron, and including no iron analyzing below 40 per cent. On the other hand, this estimate includes 50,000,000 tons having an average analysis of 54.60 per cent iron. The main advantage claimed for Cuyuna ores over ores from the Mesabi range is that of better physical structure, their use insuring freedom from flue dust troubles in smelting. The south Cuyuna ores are well adapted chemically to the manufacture of foundry, gray forge and basic pig iron. This district has largely been outlined by magnetic survey, the dip-needle having been employed. D. T. Croxton, of the Cleveland Furnace Co., Cleveland, in discussing this paper, said that from 40 to 60 per cent of Cuyuna ore had been used with good results in his furnace, and as high an average as 90 per cent had been charged in a month's run without causing any difficulties in operation. He said that the ores from this range seemed to give as good results in blast furnace operations as the best ores from the old ranges.

Case-hardening and the heat treatment of steel were discussed in two papers entitled, respectively, "Measurements and Relations of Hardness and Depth of Carbonization in Case-Hardened Steel," by Mark A. Ammon, and "The Action of Various Commercial Carbonizing Materials," by Robert A. Abbott. The results presented proved exceedingly interesting, as only a small amount of data is obtainable on these subjects. The subject of case-hardening and hardness testing, it was stated, is passing through a transitory stage and a vote of thanks was extended to the authors and to the Peerless Motor Car Co., Cleveland, where the tests were made. Other papers read and briefly discussed included "Notes on Ruff's Carbon-Iron Equilibrium Diagram," by Dr. Henry M. Howe, and a translation of N. M. Wittorff's "Preliminary Investigation of Primary Crystallization in Iron - Carbon Alloys Containing more than 4 per Cent of Carbon," by Bradley Stoughton and Simon Marcus.

"Blowing-in a Blast Furnace" was the subject of an interesting paper read on Tuesday afternoon, by R. H. Sweetser, of Columbus, O. The author stated that while there are probably as many variations of the method of blowing - in blast furnaces as there are furnace superintendents, his object was to present a blowing-in practice that has gradually developed to the point where the results are safe, sure and satisfactory; also to bring into discussion several variations that are questionable. He then described the various operations of drying-out the furnace, after a new lining has been completed; the pipe for the iron notch; filling the wood; filling the stock; putting the blast on; the first flush and first cast, and finally a list of records made by this system which is known as the Columbus method.

Cobalt-Chromium Alloys

Elwood Haynes, of Kokomo, Ind., read in abstract and followed with supplementary remarks, a paper on "Alloys of Cobalt With Chromium and Other Metals." Mr. Haynes has conducted experiments on these metals and their alloys for some years and the results which he presented aroused intense interest, which was followed by hearty applause when he passed around a number of samples of knife blades, razors, machine tools, etc., made from a particular alloy called stellite. Malleable stellite consists of cobalt and chromium and is made hard by the addition of either molybdenum or tungsten in varying proportions. Lathe tools made from this alloy are cast and then ground, and they take a cutting edge that is highly satisfactory. In the discussion that fol-

lowed, the question was raised as to the effect of certain acids on this alloy, and Mr. Haynes stated that while no conclusive tests have been made with that object in view, enough has been done to show that hydrochloric acid has only a very slight effect and that the alloy appears to be immune from the attack of nitric acid. The tensile strength varies from 85,000 to 110,000 pounds.

A series of three papers entitled: "The Manufacture of Coke," by Wm. H. Blauvelt, Syracuse, N. Y.; "By-Product Coke," by C. W. Andrews, Duluth, Minn., and "The Manufacture of Coke," by F. E. Lucas, Sydney, N. S., occupied the greater part of the afternoon, and easily constituted the feature of that session. Discussion of these three papers was reserved until all had been read. Mr. Blauvelt read his own and Mr. Lucas's paper, both in abstract, and Mr. Andrews' paper was read in abstract by Dr. Schniewind, of the United Coke & Gas Co. Mr. Blauvelt's paper on "The Manufacture of Coke," discussed in a comparative way, the bee-hive and by-product methods of making coke, the advances that have been made in each practice during the last few years, and the advantages claimed for the two methods. Mr. Andrews' paper, as its name suggests, confined itself to the by-product method, and gave a brief history of its development in this country. Mr. Lucas also discussed the by-product process, but principally from an economic standpoint, and in this connection he stated:

"When geologists and mining men tell us that, at the present rate of consumption, our coal fields will be exhausted in a few generations, we should welcome any means that will conserve these deposits as far as possible, and give us the greatest amount of heat or power from every ton mined. I shall try to show that much can be done in this direction through the by-product coke oven and that it should stand second to none as an economic factor in the industrial world."

Discussion of Coke

The following lengthy discussion, however, centered about Mr. Blauvelt's paper, and was participated in quite generally. Dr. Schniewind had prepared a discussion of this paper, which he read in abstract. He pointed out that some points made in Mr. Blauvelt's paper were not in keeping with what has been found in what is generally supposed to be good practice in coke-making. The point was also raised as to what amount of oxygen should be expected in good coking coal. In answer to this it was stated that the important thing is not the amount of oxygen, but the relation between the oxygen and hydrogen present. A principal subject of discussion between Mr. Blauvelt and Dr. Schniewind was whether the heat is transferred by radiation or convection in the process described by the former. This point apparently remained unsettled, but Mr. Blauvelt emphasized the fact that the middle wall in Semet-Solvay ovens is for the purpose of retaining heat and thus aiding in the operation of making coke by the regenerative process. In this process the ovens are subjected to great and sudden changes in temperature, due to the necessity of charging coal, which is sometimes dripping water, into ovens from which coke has been withdrawn a few moments before and which are still at a high temperature.

Coke Made from Illinois Coal

It was stated by E. W. Parker, of the United States Geological Survey, that good coke has recently been made from Illinois coal, mined in the vicinity of Danville, in that state. Another fact of considerable interest was brought out in a letter by Dr. Richard Moldenke, to the effect that tar is now being used for fuel in open-hearth furnaces by one of the largest steel works in this country. In connection with waste power as a result of bee-hive ovens, Mr. Parker also said that figures recently compiled by the Pennsylvania railroad show that if all the energy that is going to waste in the Connellsville region were changed to electric power and the latter supplied to electric locomotives, the power thus derived would be more than twice the amount necessary to move every train on that railroad from Pittsburgh to Harrisburg.

"The Concentration of Iron Ores" was the subject of a paper read in abstract by N. V. Hansell, of New York City. The author stated that "the preparation of low-grade iron ores, by concentration, whether or not followed by an agglomeration of the concentrate, has in the United States only recently been recognized as a metallurgical process of vast economical importance for its iron industry. This importance of the process lies not only in the fact that it makes possible the use of ores heretofore discarded on account of their low iron content or their too high percentage of elements deleterious in the iron industry, but also in its production of a raw material for the blast furnace that is more uniform in its physical character and chemically purer, with a higher iron content, than the general run of natural ores." According to Mr. Hansell, the paper was an attempt to show broadly the present status of the concentration process as applied to iron ores, and the possibilities for further development. An itemized list gave the processes in use in this country and the ores for which they are particularly adapted. Particular attention was also given to methods for determining the proper process for any given ore, crushing, washing, jigging, dry concentration and magnetic separation. Reference was made to various plants in this country and abroad, including Moose Mountain, Ltd., in Ontario, and the Sydvaranger mines in Norway.

In the discussion which followed the reading of Mr. Hansell's paper, E. G. Spillbury, of New York City, described a process that was used some years ago in a certain part of this country, for concentrating low-grade ores. The question was also raised as to the real economy attending the employment of some modern processes on such ores, as compared to the comparative cheapness and efficiency of the old log-washing method that was in use 20 or 30 years ago in Pennsylvania and some parts of the south, and by which it was possible to concentrate 12 tons of ore running less than 10 per cent iron into one ton of concentrates, at a profit.

Alumina in Blast Furnace Slags

A paper on "The Effect of Alumina in Blast furnace Slags," by J. E. Johnson Jr., of Ashland, Wis., was read in abstract by the author, who pointed out the necessity that exists for experiments along this line that will be of real practical benefit to furnacemen. Mr. Johnson stated that "the effect of alumina has been the subject of much discussion; some regard it as an acid, others as a base, while a few declare it can be made to act as a base or an acid almost at will." It was stated in the discussion that the paper had opened a subject of great interest to furnacemen. Charles H. Fulton, of Cleveland, stated that blast furnace slags are mixtures of minerals; that the melting point will vary according to the number of minerals present, and will be governed by the predominance of certain minerals present. It was also stated that the formation of certain minerals must be sought and others must be guarded against. Mr. Johnson added that

scientific work done to date on this subject is worthless because the investigators have studied the softening of slags, whereas a slag must be thick enough to run and live enough to desulphurize, otherwise it is worthless.

Qualities of Charcoal Iron

The last technical session was held at the Case School of Applied Science, on Thursday morning. A number of papers remained to be read and it was possible to devote only a very short time to each, with an equally short discussion. The following papers were read: "On the Quality of Charcoal Iron, a Preliminary Paper," by J. E. Johnson Jr., Ashland, Wis.; "Constitution and Melting Points of a Series of Copper Slags," by Charles H. Fulton, Cleveland; "Chemistry of the Reduction Processes in Use at Anaconda, Mont.", by Frederick Laist, Anaconda, Mont.; "Note on the Case Hardening of Special Steels," by Albert Sauveur and G. A. Reinhardt, Harvard University.

For the most part, the above papers were read in abstract. Mr. Johnson's paper was illustrated with lantern slides which added considerably to the interest in the paper. These slides showed principally diagrams and micro-photographs of pig iron sections, with the object of bringing out the hypo-eutectoid, cementite and pearlite areas and to show the cleavage lines in charcoal iron. The paper itself brought out forcibly the different grades of charcoal iron made in various sections of the country, or in the same section of the country under similar conditions, showing the great variations in the product. Some manufacturers of chilled cast iron car wheels are able to make a wheel that will greatly outlive those made by others, and Mr. Johnson conducted a series of experiments to determine the reasons for this. In his conclusions he states that spotted irons are products of carbon segregation; this segregation may take place in irons containing either more or less carbon than the eutectic ratio; the segregation is less marked and less likely to have ill effects the further the carbon is below the eutectic ratio; when the fracture of an iron shows high cleavage at the edge it is almost sure to be up to, or above, the eutectic ratio, and is virtually certain to be a weak iron. In closing the author stated that "we think that we have proven that high carbon by itself makes an iron weak and poor, but low or moderate carbon by itself is not enough."

Written discussions of this paper had been prepared by Dr. Moldenke and Dr. Howe, but were only referred to briefly. Dr. Howe stated his belief that Mr. Johnson was not correct in applying the qualities of eutectic, etc., to pig iron, on account of the remelting that the pig necessarily must undergo in the cupola, before a finished product is made. This view was objected to on the ground that bad iron will always give bad products, sometimes continuing through all processes and showing finally in finished steel.

Mr. Fulton's paper on the constitution of copper slags described briefly the formation of certain minerals, silicates, that occur in copper slags, and in the discussion it was stated that the results of the paper offer a basis for further investigation of all slags. The following papers were read by title only: "The Development of the Reverberatory Furnace for Smelting Copper Ores," by E. P. Mathewson, Anaconda, Mont.; "Our National Resources and Our Federal Government," by R. W. Raymond, New York City; and "Recent Developments in Open-hearth Steel Practice," by N. E. Maccallum, Phoenixville, Pa. E. W. Parker, of the United States geological survey, had prepared a discussion of Dr. Raymond's paper, in which he stated that he represented not himself, but the geological survey and its director, Charles Otis Smith. He took exception to several points concerning which he said that he had been misquoted in Dr. Raymond's paper, concerning statements that he had made previously about the opening of new coal mines in this country. He said that he does not advocate the closing down of coal mines that are now operating, but advises that new mines should not be opened unless conditions fully justify. The session closed with a brief address by Past President F. G. Spillbury, who spoke for the visiting members of the Institute, in expressing their appreciation of the highly satisfactory way in which this meeting had been handled and provided for by the local committee, and he moved that a vote of thanks be extended to this committee for its work. The meeting adjourned with a statement by President Kemp that the session would go on record as an exceptionally strong one.

The entire session, Wednesday morning, was devoted to a discussion of the tentative revision of the constitution and by-laws governing the business conduct of the society's affairs. During the last year, various special committees were appointed to investigate the affairs of the organization and to devise plans for future policy. While discussions of proposed changes were invited, it was announced that no definite action could be taken until the adjourned business meeting, to be held in New York City on Nov. 12.

Cause of Dual Organization

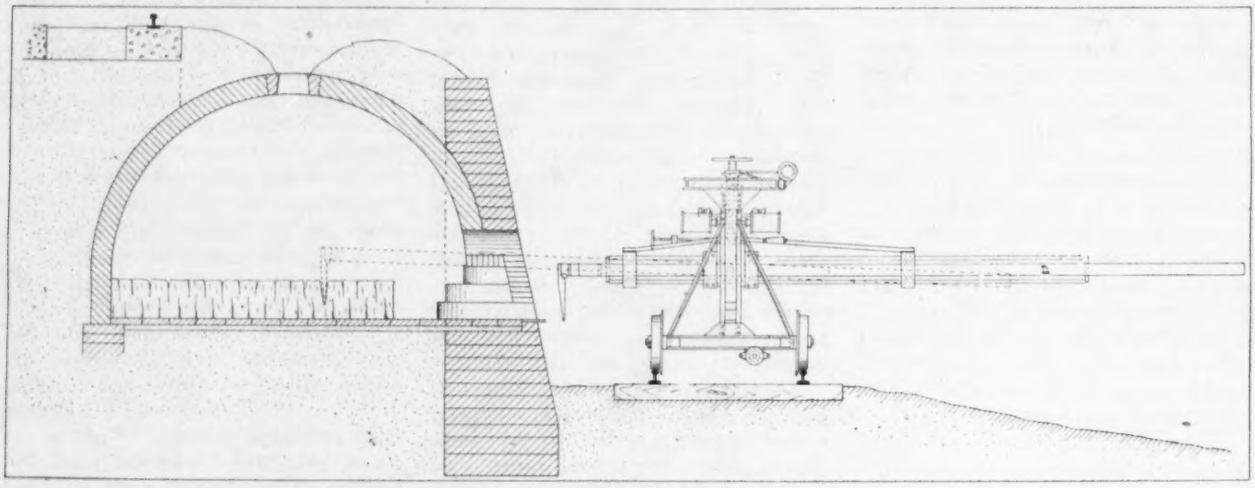
President Kemp, in opening the meeting, outlined conditions leading up to the construction of the Engineering Societies' building. Up to this time the Institute purposely had not been incorporated, but it was necessary to incorporate a few years ago in order to acquire the ground for the building. These conditions, he stated, led to the present dual organization which is objected to by some members as being inefficient. In the construction of this building, heavy financial obligations were incurred by the Institute, whose present debt in this connection is about $68,000, although it has been reduced to this from a much larger amount. It is expected that this will be still further reduced in a few months. The affairs of the Institute are now in a state of reorganization, and great progress in this direction has been made by Charles Kirchhoff.

The revised constitution and by-laws presented, were drawn up recently by a committee composed of Joseph W. Richards, chairman, Charles Kirchhof and Charles F. Rand. Mr. Rand read the more important changes that were proposed by the committee, which seemed to be generally acceptable to the meeting, with the notable exception of Article 4, which provides for the formation of a body to be known as "Fellows of the Institute". This aroused a heated discussion, in the course of which it became apparent that the younger members present seemed to be greatly opposed to such a move, whereas the older members, with a few exceptions, seemed to favor it. Although the members of the committee that drew up the changes were opposed to a definite expression of sentiment, such as a vote, nevertheless a motion was made that it be the sense of the meeting that Article 4 be stricken out, which was carried. A motion that the sense of the meeting be that there be created a body of fellows was lost. In the third by-law, relating to the duties of the secretary of the Institute, a motion was carried that the

sentence, "the secretary shall devote his entire time to the affairs of the Institute," be stricken out, with the statement that this be the sense of the meeting. It was apparent that there is still considerable dissension to be smoothed out among the members, as to the conduct of the business affairs and policy of the Institute. A line seems to be drawn rather sharply between the eastern and western members on such questions as these, the western members feeling that they are not sufficiently represented on the board of directors, council, etc. To remedy this, it is proposed to retain the management in the board of control, as at present, but to increase the membership of the council, by the addition of a number of western men, and to have the board influenced largely by the wishes of the council.

The entertainment features contributed in no small way to the pleasure of the visiting members. The committee in charge, including F. B. Richards, chairman; W. Rattle Jr., B. D. Quarrie, H. W. Lash, R. B. Sheridan and Willard Sawyer, had arranged for a series of inspection trips, which were attended by between 80 and 100 members, and were thoroughly enjoyed. On Wednesday afternoon, a special train on the Baltimore & Ohio railroad, provided through the courtesy of the officials of the American Steel & Wire Co., took the visitors on a trip of several miles up the Cuyahoga valley. The first plant visited was the Central works of the American Steel & Wire Co., where the company's blast furnaces are located and where pig iron is made for use in the company's plants further up the valley. The large power house here also was visited, and much interest was shown in the engines that generate electric power that is used at this and the other works. The original plan called for the inspection of the Cuyahoga works, but it was necessary to omit this. From the Central plant, the train went directly to the Newburg steel works of the same company. After being shown through the plant, the party was divided into smaller squads and these were shown through the extensive wire mills of the company.

On Thursday afternoon, automobiles left the Statler hotel and carried about 80 members to the works of the National Carbon Co. From the Carbon works the visitors went to the Pennsylvania railroad ore docks, where they had an opportunity of witnessing the operation of discharging the cargo from lake ore carriers with Hulett unloaders. This trip concluded with a brief inspection of the power plant at the docks, which aroused special interest.



BEE-HIVE OVEN, COKE-DRAWING MACHINE

Coke-Drawing Machine for Bee-Hive Ovens

At the Searight coke plant of the Taylor Coal & Coke Co., Uniontown, Pa., a new coke-drawing machine, designed by D. B. Stauft, operating manager of this company, has been placed in operation. When designing this machine, an effort was made to retain the principles of hand work and to avoid the application of a large amount of power in its operation. The machine is operated by compressed air and removes the entire contents of a coke oven in from 5 to 10 minutes. The coke is discharged from the bee-hive oven onto a conveyor, and two coke-drawing machines will discharge the contents of 50 to 60 ovens in eight or nine hours.

A view of the coke-drawing machine is shown in the accompanying illustration. It consists of a structural steel frame having two upright members supported by cast iron car wheels. The main cylinder is supported by a cast steel frame adjustable vertically on pivoted shafts and is arranged to swing to the right or left. This large cylinder is carried within its frame by a horizontal pivoted support which has a vertical tilting movement controlled by a lever connected to the cylinder support and to double acting cylinders mounted on a cast steel frame and moving with it. To the upper upright shaft supporting the frame carrying the main cylinder, another pair of cylinders is connected by a lever. These cylinders are mounted on the main frame from which the frame carrying the main cylinder receives its lateral motion.

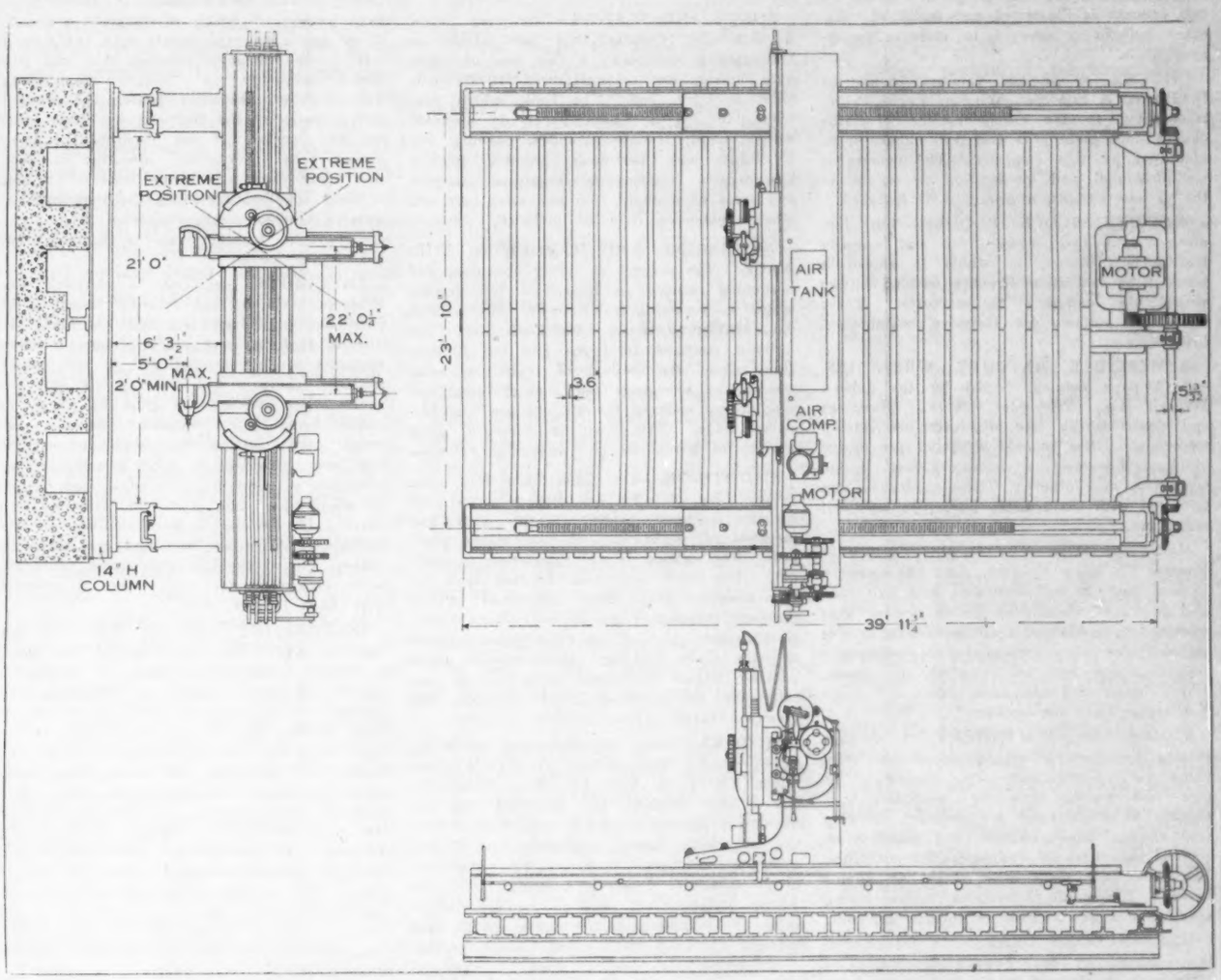
The operator's seat is located between the main frame and the oven wall. The main cylinder piston rod is of sufficient length to reach the rear and sides of the oven and is provided with steel channel supports, which slide in roller guides on either side of the cylinder. To the end of the piston rod are attached the hook and scraper, by means of which the coke is discharged from the oven. Compressed air is used at a pressure from 75 to 100 pounds. The main cylinder is 8 inches in diameter and 14 inches long, while the cylinders used for the lateral motion are 5 inches in diameter. Between the machine and the front of the oven is the conveyor apron, supported on a separate truck onto which the coke is drawn from the oven door. The conveyor then delivers the coke direct to the car without rehandling. The conveyor truck and the drawing-machine truck both are mounted on the same track.

The drawing-machine truck is con-

nected to the conveyor truck by a piston rod operating in a cylinder, 5 inches in diameter and 12 feet long. This cylinder is attached to the machine frame and is employed for the purpose of locating the drawing-machine on the track in front of the oven to be discharged. The wheels of the conveyor truck are operated by gears and both trucks are simultaneously moved from oven to oven along the yard track.

A Pit Planer for Machining Armor Plate

A pit planer for machining armor plate and which will have a capacity for operating on a surface 21 feet wide and 24 feet long, is now being built for its own use by the Bethlehem Steel Co., Bethlehem, Pa. The planer is being installed in the armor plate department of this plant and will have a cutting speed of 8 to 32 feet per minute in both directions. The quick return speed will be 32 feet per minute. In addition to the ordinary swivel head, the machine will be provided with a universal tool head with feed in all directions. The vertical feed of the tool will be from 1-32 to ½ inch and the horizontal feed, from 1-32 to 1 9-16 inches. The vertical quick adjustment of the tool bars will be 24 inches per minute and the horizontal, 30 inches per minute. A novel feature of this planer will be an electric-pneumatic balance arrangement of the tool bar. The tool holder will be balanced by an air cylinder formed in its upper part. The cylinder will have a stationary piston and the air inlet will be through the piston rod. Air will be furnished by a compressor plant bolted to the top of the cross-rail. This plant will consist of an electrically-driven air compressor and a storage tank. In the accompanying illustration is shown plan and side and front elevations of this planer, which will be operated by a 100-horsepower reversing motor, to be furnished by the General Electric Co., Schenectady, N. Y. The base of the machine to which the work will be fastened will be built of Bethlehem H-sections. More than 200 tons of these sections will be required, for the base of this, in a measure, reflects the size of the completed planer. The cross-rail and tool heads will be made of cast steel.



PLAN, FRONT AND SIDE ELEVATION OF LARGE PLANER WHICH IS BEING BUILT BY THE BETHLEHEM STEEL CO.

Locomotive Cranes

The use of locomotive cranes in the construction of the Gary plant of the Indiana Steel Co. and the South Chicago works of the Illinois Steel Co., is shown pictorially in a handsomely - illustrated, 24-page booklet issued by the Industrial Works, Bay City, Mich. This company furnished 42 locomotive cranes for use in the construction work of these plants and the application of the locomotive crane for conveying and elevating various classes of material, machinery, etc., is clearly shown.

Molybdenum is of special value in steel used in the manufacture of permanent magnets. On account of its ductility and high melting point, it is also used as a support for the tungsten wire in incandescent lamps.

Reviews of Catalogs and other Trade Publications

METAL PACKINGS.—The Metallic Packing & Mfg. Co., Elyria, O., has recently issued a catalog devoted to metal packings. Various styles of packing are shown, which are suitable for steam and gas engines, pumps, hydraulic presses and air compressors.

ELECTRIC GRINDERS.—In a four-page bulletin, issued by the Standard Electric Tool Co., Cincinnati, the line of grinders made by this concern is illustrated and described. Another bulletin is devoted to electrically-operated drills.

CHUCKS.—A 48-page catalog, issued by E. Horton & Son Co., Windsor Locks, Conn., is devoted to the extensive line of lathe chucks, face plate jaws and drill chucks manufactured by this company. The catalog is well-illustrated and in addition to details of the various chucks, a price list is included.

WOODEN BLOCK FLOORS.—The Jennison-Wright Co., Toledo, O., has recently published a leaflet, in which is shown a block floor laid with Kreolite wooden blocks which the company manufactures. These floors are suitable for factories, warehouses, bridges, etc.

REVERSIBLE RATCHET WRENCHES.—A 14-page catalog, issued by the Lowell Wrench Co., Worcester, Mass., illustrates and describes its line of reversible ratchet wrenches. These include wrenches for bridge builders, lag-screw wrenches, socket bridge wrenches, and others. These wrenches can be fitted with wood auger bits, pipe taps and drills, etc.

VENTILATION.—The Decatur Cornice & Roofing Co., New Decatur, Ala., has issued a 32-page catalog, well-illustrated with half tone and line cuts, descriptive of its line of ventilators. It is claimed that this device insures efficient ventilation without draft, effectively removing the hot and vitiated air, steam, fumes, gases and obnoxious odors. A price list accompanies the booklet.

THREADING MACHINERY.—A 20-page catalog has been issued by the Landis Machine Co., Waynesboro, Pa., describing its pipe and nipple threading machinery. A number of illustrations are included, showing clamps, die heads, nipple and pipe grips, also various sizes of the assembled machines. The latter are made with single or double heads. The catalog contains tables giving specifications and number of threads per inch.

HERRINGBONE GEARS.—An 8-page bulletin, issued by the Fawcus Machine Co., Pittsburgh, is devoted to the cut herringbone gears which it makes. A number of illustrations are given. It is stated that the Fawcus system of cutting double helical gears has reduced the manufacture of these gears to a commercial basis, making it possible to produce them with ease, accuracy and rapidity at a reasonable cost.

VALVES.—In a recently issued, 40-page, illustrated catalog, the Homestead Valve Mfg. Co., Homestead, Pa., shows its line of valves, which are made either entirely of brass, iron body with brass plug, all iron, or extra heavy brass. To meet all uses, the following types are manufactured: Straightway, three-way, four-way, angle, and special valves. Some of the brass valves are designed for pressures up to and including 5,000 pounds.

GEARS AND PINIONS.—Catalog No. 11, a supplement to No. 10, has recently been published by the R. D. Nuttall Co., Pittsburgh, and is devoted to the line of forged steel motor gears and pinions that it manufactures for street railway service. The supplement contains principally price lists of the various products adapted to all the motors of the Westinghouse and General Electric companies, with other data as to teeth, pitch, etc.

BOLTS AND SCREWS.—The Gary Screw & Bolt Co., Chicago, has just issued its first catalog describing a full line of bolts, nuts, rivets, etc., manufactured at its new plant at Gary, Ind. The book, which contains 116 5¼ x 8-inch pages, is provided with a handy thumb-nail index, enabling one to locate any particular product quickly. Considerable information regarding weights and areas of wrought iron and steel bars and other engineering data are included.

ANNEALING AND HARDENING FURNACE. The subject of rotary annealing and hardening furnaces is treated at considerable length in a catalog issued by W. S. Rockwell Co., 50 Church street, New York City. The bulletin contains 16 pages and the illustrations show the method of regulating heat, method of charging, and the charging and discharging ends of the oil and gas fuel furnaces made. This company makes a great variety of hardening and annealing furnaces.

SMOOTH-ON.—The Smooth-On Mfg. Co., Jersey City, N. J., has issued a 104-page instruction book describing the uses and methods of application of its various products. The catalog is well illustrated throughout. The more important articles made by this company are: Iron compounds; elastic cements,. casting cement, hub joints, tape, rivet cement, iron cement, iron paint, cement asbestos sheet packing, rubber cement sheet packing, coated corrugated metal gaskets. Instructions for applying these materials are given in detail.

MOTORS.—Four well-illustrated bulletins have recently been issued by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. These describe and illustrate the line of motors manufactured for pulp mill service, the machines being employed for driving grinders, chippers, barkers, wet machines, etc., equalizer flywheel hoisting sets, for which perfection of control, equalization of input or demand from the power circuit, and efficient operation are claimed; direct current, commutating-pole motors and commutating-pole, rotary converters, respectively.

ALTERNATING CURRENT SWITCHBOARD PANELS.—A bulletin issued recently by the General Electric Co., Schenectady, N. Y., describes the company's switchboard panels intended for use with alternating current. The bulletin contains 44 pages and is illustrated with diagrams showing three-phase generator panels, single and double circuit panels with time limit or instantaneous oil switch trips, and a variety of other types of panels. A 14-page bulletin, which supersedes a previous one, is devoted to direct current switchboards.

MACHINE TOOL MOTORS.—The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has issued a bulletin devoted to motors as used with machine tools. It is stated that the two fundamental factors upon which the selection of a motor for driving machine tools depends, are horsepower and speed. The horsepower recommended for a great variety of tools is given in suitably-arranged tables and is based on average practice. A diagram is also given, showing a method of estimating horsepower to take a given cut on lathes and other tools using the round nose type of tool.

WATER METERS.—The Harrison Safety Boiler Works, Philadelphia, has issued a 32-page booklet, in which is contained a resume of an article on experiments upon the flow of water over triangular notches, that was published originally in London *Engineering*. The combined feedwater heater and V-notch meter, made by the Harrison works, is based on the principle of the V-notch, the latter having been incorporated into the construction of an open feed water heater. All boiler feed supplies, including the raw make-up water, returns, discharges from traps, etc., are brought together in the heater before fed to the boiler.

SKYLIGHTS. — The G. Drouve Co., Bridgeport, Conn., has recently issued a 78-page booklet, illustrating and describing its line of skylights and other products. These skylights are constructed with a view of effectually shutting out water. No putty is necessary in holding the glass in place, the panes being well embedded between felt strips. It is stated that abundant strength has been provided to meet practically any condition of wind pressure, snow load, weight of men, etc., and particular attention has been paid to the proper securing of the skylights. A variety of forms are made, including hipped skylight with round ventilator, with ridge ventilator, with turret or monitor, with fixed louvers, etc.

LOCOMOTIVE CRANES.—The Ohio Locomotive Crane Co., Bucyrus, O., has issued a 64-page catalog, describing its locomotive cranes. A large number of excellent illustrations are included, in which are shown the large variety of uses for which the various types of cranes can be employed. These include the handling of coal, sand, stone, structural steel, pig iron, scrap, slag, etc. When equipped with magnets, they can be used for the work for which magnets are especially adapted. All bearings are made of the best quality bronze, and the shafts of forged steel. The operations of hoisting or lowering of the loads, raising or lowering of the boom, traveling or slewing in either direction can be performed independently or simultaneously.

HAND HAMMER DRILLS.—The Ingersoll-Rand Co., New York City, has issued an illustrated bulletin, in which is described the "Butterfly" hand hammer drills made by the company. It is stated that these drills are adapted for that class of service for which hand drills of 40 to 50 pounds weight are usually employed, such as pop shooting, breaking up boulders, trimming walls and all work requiring holes not exceeding 5 feet in depth. The most distinctive feature of the drill is the butterfly valve, the use of which has met with marked success in the rock drills and heavier types of hammer drills. The machine is also equipped with a simple device for cleaning the drill holes of rock cuttings not removed by the air ordinarily passing through the steel. The use of steam with these drills is recommended. The drills are made in several weights and sizes.

MECHANICAL ENGINEERS

Will Discuss Iron and Steel and Other Topics at Meeting.

Official announcement is made of the annual meeting of the American Society of Mechanical Engineers to be held at the headquarters of the organization, 29 West Thirty-ninth street, New York, on Dec. 3 to 6. No less than 10 sessions are contemplated with papers grouped to form symposiums upon various subjects. An important feature will be the presentation of an executive committee report prepared by the power tests committee, which will supersede the earlier reports upon the methods for conducting trials of pumping engines, locomotives, steam boilers and steam engines, besides taking up the testing of other apparatus, such as oil and gas engines, water wheels and compressors, blowers and fans. The latest society report on any of these subjects was in 1902.

The tentative program provides for the president's address followed by a reception to the president-elect and to the retiring president, Dr. Alex. C. Humphreys, and their ladies, on Tuesday evening. Wednesday morning, Dec. 4, a business session will be held, followed by simultaneous sessions under the direction of the gas power section and the sub-committees on machine shop practice and textiles. Reports of committees will be presented in the afternoon. In the evening a testimonial dinner will be attended by the society and friends of Prof. John E. Sweet, honorary member and past president, in celebration of his 80th birthday and in recognition of his services to the engineering profession. Thursday morning, Dec. 5, will be given over to simultaneous sessions on railroads, iron and steel, and cement manufacture. In the afternoon will be sessions on the power plant, and on hydraulic and pneumatic apparatus. On Thursday evening will occur a reunion dance with collation. Friday morning, Dec. 6, will be devoted to transaction of final business.

Report Shows Gain

The twelfth annual report of the Crucible Steel Co. of America, and its subsidiaries for the fiscal year ended Aug. 31, just issued, shows gross earnings of $5,113,957.69, as against $4,080,518.35 for the preceding fiscal year. Net profits, applicable to dividends, this year are $3,424,996.35, as against $2,557,518.35 for the year ending Aug. 31, 1911. This year's results are exceedingly gratifying, considering the difficulties under which the company struggled during the first half. The net profits applicable to dividends, which are equivalent to 13.70 per cent upon the preferred stock, are determined after charging against the operations of the year $786,419.71 for repairs, $650,000.00 for depreciation and renewal of plants, besides $5,863.99 for contingencies.

The earnings by quarters are:

First quarter, end. Nov. 30, 1911	$1,141,007.48
Second quarter, ending Feb. 29, 1912	1,142,767.42
Third quarter, end. May 31, 1912	1,393,112.15
Fourth quarter, ending Aug. 31, 1912	1,437,070.64
Total	$5,113,957.69
Deduct charges and apprs.:—	
Repairs	$786,419.71
Depreciation	650,000.00
Contingencies	5,863.99
Interest on scrip, and bonds of subsidiary companies	246,677.64
	$1,688,961.34
Net profits for div.	$3,424,996.35

TAR USED FOR FUEL

By Indiana Steel Co., in Open-hearth Furnaces. at Gary, Ind.

Recently the Indiana Steel Co., Gary, Ind., has been experimenting with the use of tar as a fuel for its open-hearth furnaces in place of producer gas. The result of these operations has been very successful, and at the present time two furnaces in open-hearth unit No. 1 are being operated exclusively with tar. The tar is used in its liquid state as it comes from the by-product coke oven plant and is handled very much like fuel oil. The burners are similar to those used for oil and the tar is atomized with steam.

The coke ovens at Gary are now producing about 250,000 tons of coke and about 1,000,000 gallons of tar per month. This amount of tar is said to be sufficient for approximately six of the 60-ton open-hearth furnaces of the type installed at Gary. It will be readily seen, therefore, that it will be possible to operate only a fraction of the furnaces with tar, there being 56 furnaces in the four open-hearth units operated by the Indiana Steel Co.

It has been suggested that the use of tar might serve to relieve the difficulties of the steel foundries in the west due to the curtailment of the supply of fuel oil. In some cases this may offer a solution of the fuel oil problem, but there is not sufficient tar on the market to permit of its being used generally. The roofing manufacturers now absorb large quantities and the amount remaining for fuel purposes is comparatively small.

LARGE INCREASE

Made in Assessment of Iron Ore Value by Tax Commission.

The Minnesota tax commission has completed the equalization of the iron mineral properties in St. Louis, Itasca and Lake counties. After deducting the 1911 shipments of 23,221,070 tons, and the stock piles of May 1, 1912, of 8,170,537 tons (assessed as personal property), and making adjustments for the new tonnages developed during 1911 and for revised calculations on old tonnages, the net result is 1,401,340,743 tons. This amount of developed, measured merchantable ore remaining in the ground is distributed as follows:

	Tons.
St. Louis county	1,233,014,609
Itasca county	167,822,791
Lake county	503,343
Total tonnage	1,401,340,743

It is contained in deposits in the following iron ranges:

	Tons.
Vermillion range	10,957,708
Mesaba range	1,390 383,035
Total tonnage	1,401,340,743

The total equalized assessment against this tonnage remaining in the ground is $254,553,179. The total tonnage for 1911 was 1,367,474,853 and the total assessment, 1911, was $232,368,469.

The tonnage for 1912 is increased 33,865,890 tons and the assessment for 1912 is increased $22,184,710. The increase is due partly to the increased tonnages shown above, but more largely to increases in the assessed valuation of all mineral property made by the tax commission.

The assessment of mineral properties on the Cuyuna range shows a large increase over the previous assessment. The iron ore bodies of that range will soon be sufficiently developed that the tonnage may be accurately measured and the grade determined.

SUMMARY OF TAX COMMISSION'S MINERAL ASSESSMENT OF IRON ORE CONTAINED IN ST. LOUIS, ITASCA AND LAKE COUNTIES

Year.	Remaining tonnages May 1.	Assessed Value.	Shipments, tons.
1907....	1,192,509,757	$186,720,026	29,180,975
1908....	1,193 728,959	174 273,632	18.098,894
1909....	1,310,190,194	199,008,838	29.284,496
1910....	1,347,596,291	220,423 038	30,317 583
1911....	1,367 474.853	232,368.469	23,221,070
1912....	1,401,340,743	254,553,179	.....

The assessment of personal property, including stock piles, prospects and mineral lands is not included.

The mineral lands containing the above tonnages were assessed in 1906, the year prior to the organization of the tax commission, at $64,485,409.

THE IRON TRADE REVIEW

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October's Great Record

October has quite fulfilled the predictions that were made for it in establishing a new high record of steel production in the history of the industry of the United States. From the statistics available which, though only partial, are authoritative and cover a large fraction of the total, it is reliably indicated that the ingot output of the steel works of the United States in October reached between 2,900,000 and 3,000,000 tons, or at the rate of between 35,000,000 and 36,000,000 tons a year. The highest previous record attained by the industry was also in the present movement and came in May of this year. The production then was approximately 2,600,000 tons, or at the rate of about 31,500,000 tons per annum.

The ingot output of the Steel Corporation in October broke all records and was considerably in excess of 1,500,000 tons. If the independent interests had done fully as well as the leading producer, which is driving its plants at an unprecedented gait, the 3,000,000-ton mark for the month would have been fully reached and probably surpassed. There are some indications that suggest, however, that the independent production relatively was not quite up to the scale of the largest producer.

The marvelous expanse of the present iron and steel market is concretely expressed in the October figures of crude production. At the rate of output then attained, the 26,000,000-ton mark of 1910, which hitherto represented the high yearly record, loses much of its impressiveness.

The month of October, usually with 27 working days and because weather conditions are especially favorable, has long held the premiership of output in the American steel industry. The wide degree by which it has surpassed its previous records demonstrates what a remarkable period in the American industry the present year is proving to be and it effectively puts to rout the doubt of the recent past expressed whether this country had attained the dignity of a 30,000,000-ton per year consumption.

Another indication of the present great activity of the industry is found in the iron ore shipments from the Lake Superior ranges in October, when 7,010,219 tons were moved, making the greatest tonnage of any October in the history of the trade. The next largest October tonnage was in October, 1909, when 6,625,801 tons were moved.

The Country's Pig Iron Capacity

The curious thing about the pig iron productive capacity of the United States is that it appears large when the industry is not prosperous, and small when it is. There are many industries which show a precisely opposite tendency. As they find more business, they expect the productive capacity to become fully engaged, but capacity which had not been reckoned upon suddenly appears in the reckoning. It is not so in the iron and steel industry, for the rate of 31,000,000 tons of pig iron a year, which has been maintained in the past two months, appears almost insignificant by comparison with statements made only recently and given rather wide credence. Such statements have generally indicated a total capacity of 37,000,000 to 40,000,000 tons, and one statement, compiled six months ago, placed the total at 45,000,000 tons, with an allowance of not more than 10 per cent for unfit furnaces, plus the percentage which must usually be idle for relining and other repairs, thus setting up a claim that the country's effective capacity exceeded 40,000,000 tons.

Comment upon the statement just mentioned was made in THE IRON TRADE REVIEW of June 13, 1912, under the caption "Physical and Commercial Pig Iron Capacity", to the effect that before the physical capacity of the furnaces was reached, the supplies of coke and ore would prove insufficient. The stand was taken that at the particular juncture in which the trade found itself, the supply of coke would furnish the first limitation and the supply of ore the second limitation, while the supply of physically fit furnaces would furnish merely a third limitation, assuming for argument that the first two were wiped out. It was remarked, as to the physical capacity of furnaces themselves: "The last named is usually considered first. Really it is the third limitation, and of no immediate importance at this time."

Events of the past six months have fully justified the position then taken. The country has been making pig iron at the rate of only 31,000,000 tons a year, and more than $4 a ton has been paid for Connellsville furnace coke for prompt shipment. Lake Superior ores have been sold lately at substantial premiums over the season prices, and the supplies offered are decidedly limited.

It is possible now to look more closely into the case than could be done six months ago. Where are the idle furnaces? Idle furnaces with 10,000,000 tons

of annual capacity ought to be conspicuous. It is plain that there are only a few. Very few, indeed, are those whose owners could at the moment supply them with coke. Assuming an unlimited supply of coke at a very moderate price relative to present prices of pig iron, say $2 a ton, one cannot find at the outside more than 2,000,000 or 3,000,000 tons of idle furnace capacity, able to make pig iron without loss when given full supplies of raw material and labor at fair prices, in harmony with the selling price of pig iron.

The estimates of actual available blast furnace capacity in the country made from time to time by THE IRON TRADE REVIEW have always appeared small by comparison with statements drawn from lists of furnaces, carrying many altogether unfit stacks, with individual furnaces frequently over-rated and with inadequate allowance made for relinings, but our estimates have always stood the test of actual experience. For the beginning of this year our estimate was 33,402,000 tons, which with allowance for new furnaces since completed would make about 34,000,000 tons capacity at the present moment. This, if anything, is outside the mark.

Of course, the total physical capacity of the blast furnaces of the country is an item of some interest, in certain connection. The reason so many have been misled by exaggerated statements is that the statements are useful, if at all, in one connection only, and they are used for another purpose, generally to discuss, in a period of depression, how much of an increase in demand would be required to make the industry prosperous. If pig iron is, say, $13 a ton at northern furnace, and 25,000,000 tons a year are being made, the furnaceman would be glad to have the price advance merely $2 a ton, to $15, and it is really nothing to him that should the price advance to $25 or $30 a ton, the country might be able to make 35,000,000 or 40,000,000 tons. The interesting question is what the available capacity would be upon an advance to $15, and that capacity would probably be not over about 30,000,000 tons.

It should be observed that the fact that a blast furnace has recently been active is no proof that it will become active again. Furnaces are continually being put out of the reckoning, and this is a feature not simply of poor times, but of relatively good times also. Almost every year in the history of the American iron industry, several furnaces at least have been blown out and have never resumed. Sometimes, prosperity, by advancing raw materials and wages, puts a furnace out of business when under apparently less prosperous conditions it could operate at a profit. The list of effete furnaces is a long and constantly growing one.

Mining Engineers' Meeting

The Cleveland meeting of the American Institute of Mining Engineers, in session from Oct. 28 to 31, will probably be recorded in the annals of the Institute as a memorable event, and rightly so. It constituted, in reality, a meeting of the Iron and Steel division, recently formed, and the assortment of papers presented showed conclusively that the subject holds a live interest for many members, notwithstanding the prominence that is being given to iron and steel by other societies and associations.

The total attendance was about 150, and included a number of men prominently identified with this greatest of industries and to whom great credit is due for their efforts that helped make the meeting the success that it was. It would not be fair to mention the subject without a special word for Bradley Stoughton, whose work was so largely responsible for the careful selection of papers pertaining to the steel industry. These papers had an unusual scope and depth.

The program of entertainment provided by the local committee was rightly appreciated, and contributed in no small degree to the enjoyment of the visitors. Cleveland is a city of many industries, and a selection of but a few points of interest from the many available, is not an easy matter. The trips to the American Steel & Wire Co.'s plants in the Cuyahoga valley, the National Carbon Co., and the Pennsylvania ore docks proved easily that the choice was a satisfactory one.

The business affairs of the Institute were an important feature of one session. While it is evident that internal troubles have formed a part of the Institute's recent history, it is also evident and gratifying that these are about to be smoothed out. Any other outcome would be disastrous, indeed, to this old society, which has been aptly termed a great democratic organization.

Position of the Car Shops

Our news reports lately have indicated that car orders placed in October covered between 40,000 and 45,000 cars, bringing the year's total of lettings to 140,000 or 145,000 cars. There has been a sudden increase in the rate of buying, since the orders placed in October amounted to more than the orders for three or four months preceding, and the pending inquiry is large, promising a continuance of the movement for some time.

Despite the fact that the car shops have been working as fully as the supply of steel and of labor would permit, they now have on their books fully as much business as they had at the beginning of this year, when for several months they had been in receipt of very large orders. In fact, the buying throughout the year has been such as to keep the shops with from 75,000 to 100,000 cars on their books, enabling them to see a continuance of operations for at least six months. The year's car output will probably be between 175,000 and 200,000 cars, and may easily exceed the higher figure.

When the railroads began buying cars on a liberal scale, a trifle over a year ago, it was pointed out that the orders had been prompted in large part by the extremely low prices prevailing, plates being furnished in some cases at a cent a pound, with other materials in proportion, and the car builders themselves figuring scarcely any profit. It was feared that with advancing prices for iron and steel, and with the car builders in the mood to charge a reasonable profit for building cars, the orders would decrease, but the position is that with the raw materials bringing $7 to $8 a ton higher prices, and moderate profits being figured for building, the orders are being placed at as great a rate as ever. Railroad earnings have increased, the August report showing the largest earnings on record for any August, and the largest but one for any month, so that railroads are in position to buy, and the state of their facilities, in proportion to the traffic offered, practically compels them to buy.

MEN OF THE IRON TRADE

E. W. Beadle, general manager of the Pennsylvania Engineering Co., New Castle, Pa., has sailed for Germany where he will visit the Krupp steel works at Essen.

J. E. Fisher, formerly superintendent of the plant of the Beaver Dam Malleable Iron Co., Beaver Dam, Wis., has been appointed superintendent of the Beaver Dam Foundry Co., of that place.

Arthur Windsor Richards, of Army and Navy Mansions, London, has been appointed the special representative of the board of directors of the New Russia Co., Ltd., and general superintendent of its works in Russia, where the company owns large iron and steel works and collieries. Mr. Richards will make periodic visits to Russia.

John Reid Jr., who for the past six years has had charge of the Pittsburgh sales office of the Stowe-Fuller Co., has resigned that position. On Nov. 1 Mr. Reid took up the management of sales for A. J. Haws & Sons, Ltd., Johnstown, Pa. For the present all sales for the Haws company will be handled from Johnstown.

W. Beardmore, former vice president on the council of the Iron and Steel Institute, London, has been appointed treasurer, consequent upon the death of W. H. Bleckly, former treasurer. J. M. While has been elected a vice president to fill the vacancy thus created while Lord Airdale, of Gledhow, has been elected a member of the council.

George Burnham, for many years senior member of the firm of Burnham, Williams & Co., which was succeeded by the Baldwin Locomotive Works, is ill at his Philadelphia home. Mr. Burnham, who retired from active participation in the locomotive business about five years ago, is 96 years old. He has been confined to his home since his return from Beach Haven, N. J., a month ago.

Dr. Wilhelm Schumacher, of Berlin, the well-known expert on the briquetting of flue-dust and iron ores, has arrived in this country on an inspection trip in the interest of the General Briquetting Co., which represents the Schumacher process in the United States. Dr. Schumacher has been in Buffalo, looking over his process which has recently been installed at the works of the Lackawanna Steel Co.

George A. Thompson, formerly with the Sellers Mfg. Co., has recently become associated with W. H. Meyst, district sales manager for the Deforest Sheet & Tin Plate Co. and the Buffalo Copper & Brass Rolling Mill. He will devote his attention to selling sheet steel, copper and brass in the Chicago district. This addition to the Chicago selling force has been deemed necessary to properly handle the increased business.

George E. Long, former treasurer of the Joseph Dixon Crucible Co., Jersey City, N. J., was elected vice president of the company to succeed the late William H. Corbin, at a recent meeting of directors. J. H. Schermerhorn, former assistant secretary and assistant treasurer, has been elected to membership on the board of directors and chosen treasurer of the company. Albert Morris has been elected assistant secretary and assistant treasurer.

H. B. Richmond, Merrill, Wis., and George Schueppert, Oshkosh, Wis., have purchased the principal interest in the Merrill Iron Works, Merrill, the ownership of which passes from John O'Day. Mr. Richmond was formerly secretary of the Merrill Iron works, resigning several years ago to engage in the automobile business. Mr. Schueppert has been superintendent of the sales department of the Oshkosh, Wis., Logging Tool Co. David Pickett, for many years superintendent of the foundry department, will be retained and the entire working force will be kept intact. The name of the concern will not be changed.

M. J. Butler, formerly Canadian deputy minister of railways and canals, and lately manager of the Dominion Steel Corporation, has resigned his position with that firm, and leaves this month. It is understood he is to be connected with another steel undertaking. No successor will be appointed, his duties being undertaken in the case of the steel plant by Mr. Martin, and in that of the coal mines by D. Macdougall, while other duties will be assumed by C. S. Cameron, secretary-treasurer of the corporation. Mr. Butler went to the steel company in 1910, resigning the positions of deputy minister of railways and canals and chairman of the Intercolonial Railway commission.

David Tod has been elected president and A. H. Helander second vice president of the William Tod Co., Youngstown, O. Mr. Tod, former state senator, is a son of the late William Tod, first president and founder of the company, and succeeds John Stambaugh, whose office of treasurer of the Brier Hill Steel Co., in connection with other duties, occupies his time. Mr. Helander was formerly vice president of the Mesta Machine Co., Pittsburgh.

S. G. Gilfillan, who has been secretary and treasurer of the Belfont Iron Works Co., Ironton, O., for more than 30 years, was elected president and general manager at a recent meeting of the board of directors. He succeeds the late Barton H. Burr. John Peebles, Portsmouth, O., will continue to serve as vice president. John R. Gilfillan was elected secretary, and C. W. Moulton was chosen treasurer. S. B. Steece was chosen a director of the Ashland Steel Co., to take the place of Mr. Burr upon the board of the concern. E. W. Bixby, Ironton, is the new member of the board of directors of the Belfont Iron Works Co. Resolutions of respect and condolence upon the death of Mr. Burr were adopted.

Albert L. Nash, member of the house of Crocker Bros., New York, who was quite seriously injured Saturday, Oct. 26, while on a tour of inspection of the Homestead steel works of the Carnegie Steel Co., with a party of members of the American Iron and Steel Institute, is recovering from the effects of the accident. A steel car wheel, which was lying on the mill floor, cooling after having just come from the press, exploded in some mysterious manner and a fragment struck Mr. Nash in the leg, inflicting a compound fracture. In the party at the time were W. A. Rogers, of Buffalo; D. B. Meacham, of Cincinnati, and M. C. Armour, of Chicago, all of the firm of Rogers, Brown & Co., and other prominent iron and steel men. The explosion of the wheel represented a very unique accident and is attributed to internal stresses.

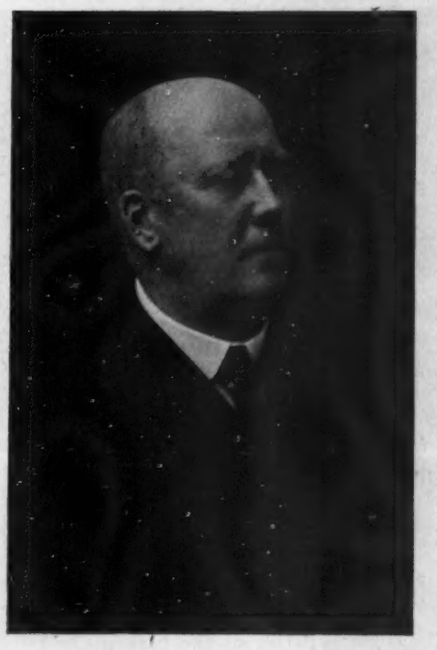
OBITUARIES

W. B. Davock, who has been in charge of the vessel properties of H. H. Brown & Co., Cleveland, since 1890, died Sunday, Nov. 3, at his residence in that city from a general breakdown, which was preceded by a cold contracted recently. Born in Buffalo, July 4, 1846, he went to Cleveland in the early 70's, and opened a pig iron and ore brokerage office. A few years later he formed a partnership with John N. Glidden under the firm name of Davock & Glidden. The firm was dissolved in 1879, and Mr. Davock became engaged in the pig iron and iron ore departments of Brown & Co., during the early years of his connection with the company, but in 1890 took charge of the vessel properties of the firm. Through his activities, W. P. Snyder, of Pittsburgh, was interested in the lake transportation business in 1906. Upon the organization of the Shenango Steamship Co., and the building of the steamer W. P. Snyder, Mr. Davock became manager of the Shenango boats, as well as the Brown interests. He built the steamer W. B. Davock the following year. Mr. Davock was relieved of the active management of the Snyder boats when Mr. Snyder opened an office in Cleveland, but continued with the company as advisory manager. Mr. Davock was a director of the Cleveland Folding Machine Co., and a member of the welfare plan committee of the Lake Carriers' Association.

Timothy W. McNamara, a pioneer mining man in the Lake Superior ore region, is dead in Pierre, N. M. Mr. McNamara was formerly superintendent of the Auburn mine on the Mesabi range, later taking a position with the Colorado Fuel & Iron Co., at Pueblo. He was later transferred to New Mexico, where he had been for the past few years. The deceased was a brother-in-law of John McDowell, superintendent of the Morris, Winnifred, Burt-Pool and Sellers properties on the Mesabi range.

William B. Ogram, contracting manager of the American Bridge Co., in the Philadelphia district, died at Philadelphia, Oct. 31, from the effects of a stroke of apoplexy sustained a few days prior. He was 55 years of age. Mr. Ogram was very well known in the eastern fabricating trade, having represented the American Bridge Co., in Boston, Buffalo and Philadelphia. Early in life he was employed by Wm. Sellers & Co., Philadelphia, and later he became a wholesale hardware merchant. He entered the employ of the A. & P. Roberts Co., Philadelphia, and when that company was absorbed by the American Bridge Co., he engaged in the service of the latter corporation. He was a member of several Philadelphia clubs.

Edward P. Botsford, secretary and treasurer of the Pittsburgh Malleable Iron Co., Pittsburgh, died Oct. 30,



W. B. DAVOCK

at Denver. He was 52 years old. On Aug. 25, Mr. Botsford went west on business; on Sept. 11, while at Denver, he was attacked by appendicitis and was operated upon. Complications followed. The direct cause of his death was a blood clot on the brain. Mr. Botsford was born in St. Louis, and became identified with the iron and steel trade about 25 years ago, when he joined the Connellsville Coke & Iron Co., at Pittsburgh, being an associate of N. P. Hyndman, now Pittsburgh representative of the Washington Coal & Coke Co. and other interests. Several years later, Mr. Botsford went to Shenandoah, Va., where he acted as treasurer of the Shenandoah Furnace Co. A few years later, he returned to Pittsburgh and became associated with the Pittsburgh Malleable Iron Co. in the capacity of secretary and treasurer. His brother, J. A. Botsford, is connected with the Pittsburgh Malleable Iron Co. Funeral services were held Nov. 6, at Pittsburgh.

Peter Patterson, 70 years old, the oldest employe of the National Tube Co., died Oct. 30 of heart failure, at his home, 801 Braddock avenue, Pittsburgh. Mr. Patterson had been chief consulting engineer for the National Tube Co. 10 years, and was retired on a pension Oct. 1 because of ill health. He was born in Jedburgh, Scotland. His father was a machine manufacturer, and it was in his father's shops that Mr. Patterson obtained his first mechanical experience. After serving an apprenticeship, he went to Edinburgh and Glasgow, where he became an expert in engine construction. Upon his second trip to this country, he became identified with the National Tube Works, at Boston, Mass., where the first plant of the company was built. In 1870, Mr. Patterson went to McKeesport, Pa., to build a plant for the company. He was promoted to master mechanic of the plant. Later he built the National Rolling Mill for the company, and in 1881 became general superintendent of the works, in which position he remained until 1897, when he became chief consulting engineer. Mr. Patterson built the Seamless Works, at Christy Park, McKeesport. During the past 10 years he had acted as chief consulting engineer of all of the works of the National Tube Co., and advised in the construction of the plant in McKeesport. When he retired from active service a month ago he had been with the company 42 years. Mr. Patterson leaves a widow, three sons and two daughters. One son, P. C. Patterson, is chief engineer of the National Tube Co.; another, John Rae Patterson, Swissvale, Pa., is head of the claim department of the National Tube Co.; and the third, Thomas Patterson, of Elyria, O., is superintendent of the National Tube plant at Lorain, O.

Steel Corporation Hearing Concluded at Pittsburgh

And Will Be Resumed at Washington Nov. 15—Then the Corporation Will Begin Presentation of Its Testimony

The hearings in the suit of the government for the dissolution of the United States Steel Corporation Oct. 30 were the last to be held in Pittsburgh. At the close of the proceedings on that day, another adjournment was announced and this will last until the middle of November, when the hearings will be resumed in Washington. The government has now put in most of its evidence and it is probable that the hearings in Washington will be the last. It is expected that counsel for the Steel Corporation will begin its hearings about the middle of December in New York. Most of the witnesses for the Steel Corporation will be summoned to that city, although sessions in other cities will probably be necessitated.

The witnesses examined last Wednesday were Joseph G. Butler Jr., vice president of the Brier Hill Steel Co., Youngstown, O.; D. T. McCabe, fourth vice president of the Pennsylvania Co., Pittsburgh; C. D. Marshall, president of the McClintic-Marshall Construction Co., Pittsburgh; C. E. E. Childers, formerly secretary of the Western Pennsylvania & Eastern Ohio Traffic Association, Pittsburgh; Willis L. King, vice president of the Jones & Laughlin Steel Co., Pittsburgh, and Robert A. Walker, resident editor of The Iron Age, in Pittsburgh.

The most interesting of the witnesses at the last Pittsburgh session was Joseph G. Butler, Youngstown, O., vice president of the Brier Hill Steel Co., and a director of the Youngstown Sheet & Tube Co.

"How old are you?" asked Judge Dickinson.

"I have reached the scriptural age limit," said Mr. Butler.

"Three score and ten?" queried the judge.

"Seventy-one," answered Mr. Butler.

Mr. Butler said he had been interested in the manufacture of pig iron since 1866. He was asked to tell about the Bessemer Pig Iron Association. This, he said, was formed about 17 years ago. He acted as its secretary until the association was disbanded two years ago. Its members, said Mr. Butler, were the Youngstown Steel Co., Youngstown Sheet & Tube Co., Brier Hill Iron & Coal Co., Struthers Furnace Co., Pickands, Mather & Co., M. A. Hanna & Co., Hitchcock Iron Co., and probably one or two others. The combined output of these companies in 1901 was about 1,000,000 tons a year. The duties of the secretary, said Mr. Butler, were the sale of pig iron, gathering of statistical information and keeping track of the furnaces, ore stocks, etc. The statistical information, Mr. Butler said, he secured by sending out blanks to be filled in and returned by the members of the association.

The witness was asked to explain how sales were made and how the orders were distributed among the various companies in the association. When he received an inquiry, Mr. Butler said, he would get in touch with the members and inform them that he had an opportunity of making a sale at a certain price. The order would then go to one of the companies in the association, or be divided among several of them.

James H. Hoyt, of Cleveland, said Mr. Butler, was the attorney for the association and to him the papers and statistical records were regularly turned over. Mr. Hoyt, the witness said, was employed to keep the association "out of difficulties."

"Explain what you mean by that," requested Judge Dickinson.

"We were all law-abiding citizens," said Mr. Butler, "and did not want to violate the law."

"Did the United States Steel Corporation ever place orders for Bessemer pig iron through the association?" asked Judge Dickinson.

"Yes, the Steel Corporation was one of our best customers."

Who Set the Price?

Mr. Butler was asked who set the price when business was done with the subsidiaries of the Steel Corporation. He explained that when the Carnegie Steel Co. was in the market, Mr. Dinkey would inform him that he wanted a certain number of tons at a certain price.

"Mr. Dinkey was always a close buyer," said Mr. Butler. "Sometimes the association took the business at the price he named. At other times I would give him reasons why we wanted a higher price than he named and if these appeared fair to him, the contract would then be made at this price."

Mr. Butler said the Steel Corporation subsidiaries would place contracts for 400,000 tons or more at a time and that such an order would be distributed among the various members of the association. The Steel Corporation generally purchased through the Carnegie Steel Co., which in turn sold scattered tonnages to the other Steel Corporation subsidiaries. The Republic Iron & Steel Co., the Youngstown Sheet & Tube Co., and the Pennsylvania Steel Co., said the witness, were also large customers of the association.

"Did you attend a meeting held in the offices of the Federal Steel Co., Chicago, on July 26, 1900, at which Judge Gary and C. M. Schwab were present, and at which you represented the Bessemer Furnace Association?" asked Judge Dickinson.

"My memory is not weak, but I do not recollect it," said Mr. Butler.

"Did you act as one of a committee of five, appointed at a meeting in the Carnegie Steel Co.'s offices in Pittsburgh, in 1903, for the purpose of bringing about a curtailment in pig iron production?"

"I do not recall it," said Mr. Butler.

"Were you ever a member of a committee appointed to discuss a curtailment in pig iron production?"

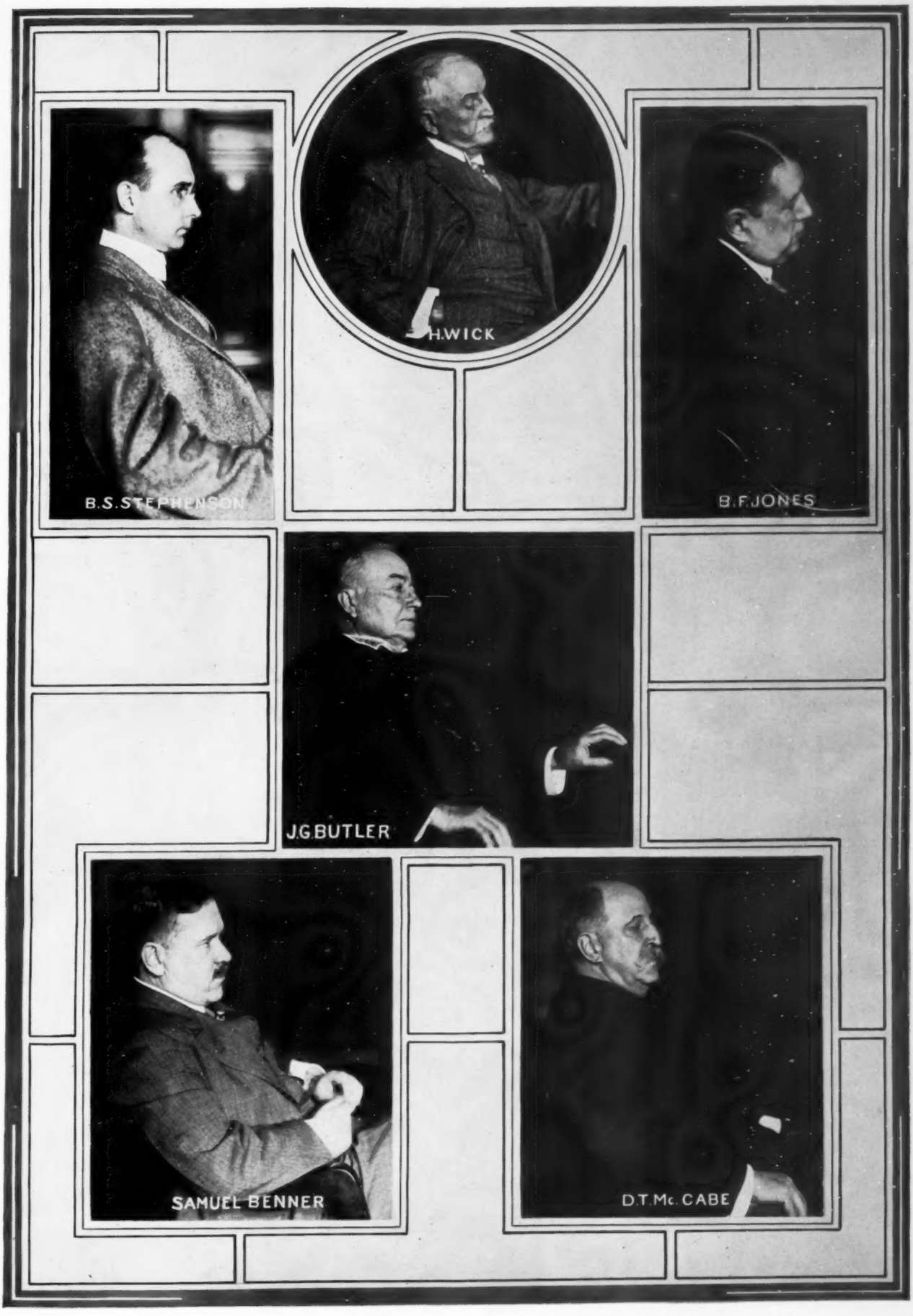
"Yes, I remember having been on some such a committee."

"Did you ever serve on such a committee on which were represented any of the subsidiaries of the Steel Corporation?"

"I do not recall it."

"Do you remember any committee which was appointed in 1903, which took up the question of curtailing pig iron production and which announced that all furnaces making more than a certain tonnage should curtail their production by 25 per cent from Oct. 1, 1903, to the end of the year."

"I do not recall that," said Mr.



SOME OF THE WITNESSES AT RECENT STEEL CORPORATION HEARINGS AT PITTSBURGH

Insert The Iron Trade Review, *Nov.* 7, 1912.

Butler. The witness explained that. in regard to curtailment, each company did what it thought was best for its own interests. Mr. Butler also said that the Bessemer Pig Iron Association never took any concerted action regarding the operation of blast furnaces.

"What was the effect of the association on the companies composing it?" asked Judge Dickinson.

"It had a very good effect," replied the witness. "It enabled us to get something more than cost for our product."

Mr. Butler said that he furnished the members of the association with a weekly letter, explaining the state of the market, etc. He said he also gave out news to representatives of THE IRON TRADE REVIEW and *The Iron Age*. Mr. Butler was asked how he regarded these papers and what reputation they bore in the trade for accuracy. The witness replied that he regarded them both very highly, both for their reliability and their ability to get accurate news. What evidently moved Judge Dickinson to ask this question, was that he had based all his questions regarding the committee meetings, which Mr. Butler could not recall, on articles which appeared in these two trade papers.

"Do you remember a meeting by blast furnace interests in the Pittsburgh, Youngstown and Wheeling districts, held at the Duquesne club, Pittsburgh, on Jan. 30, 1908?"

Mr. Butler said that he was chairman of this meeting but that he could not remember any individuals who were present, or that, following the meeting, any announcements were given to the trade papers regarding changes in prices.

"Do you remember a meeting of pig iron manufacturers of the central west at which W. E. Corey was present?"

"Yes, an ore meeting held at the offices of some ore company in Cleveland in 1907 or 1908 at which Mr. Corey was present. Pig iron may have been mentioned."

Mr. Butler said that he only attended the meeting for a couple of hours. He remembered seeing Messrs. Frank Billings, Samuel Mather, E. W. Oglebay and F. B. Richards at the meeting. He could not recall anything said by Mr. Corey. As near as he could remember, the discussion centered on general conditions in the ore market and, possibly, pig iron.

"Did you attend a meeting in New York City on June 11, 1908, at which Judge Gary was present?"

"I do not recall it," said Mr. Butler, "but then, I attended a good many meetings."

D. T. McCabe, Pittsburgh, fourth vice president of the Pennsylvania Co., was asked to tell something about the Central Freight Association, and, after naming a number of railroads which were members of this body, he explained that this association dealt with freight rates, routes, etc., in the central freight district. This district the witness defined roughly as including the section west of Erie, Pa., Bellaire, O., and Pittsburgh; south of an imaginary line drawn through the great lakes; east of the Mississippi river and north of the Ohio river. This body, said Mr. McCabe, does not regulate the rates on ore and coke, these rates being considered at separate meetings. The latter meetings, however, are not held under the auspices of any association and are generally informal affairs. Mr. McCabe told about one such informal meeting which was held in Cleveland in 1909, on which occasion he met with representatives of the Baltimore & Ohio, Erie and New York Central roads to discuss the desirability of changing the prevailing ore rates.

Mr. McCabe was also questioned about the Western Pennsylvania & Eastern Ohio Traffic Association, of which he is chairman. He said that this association is no longer of any moment as it has held no meetings within the past two years. The witness was questioned regarding certain meetings at which the rates on coke were discussed. He admitted that there were such meetings but said that he was unable to say anything about what transpired, as the records of these meetings had been in charge of C. E. E. Childers, secretary of the Western Pennsylvania & Eastern Ohio Traffic Association.

Mr. McCabe was also asked to tell about the meeting at which James A. Campbell, president of the Youngstown Sheet & Tube Co., presented a petition to the representatives of various railroad companies, asking that the rates on ore and coke in the Youngstown district be reduced. The witness could not recall all the details of this meeting but admitted that he was present. He also said that representatives of the Baltimore & Ohio, New York Central and Erie railroads, as well as F. C. Baird, of the Bessemer & Lake Erie road, were there. In cross-examination by David Reed Jr., however, it was shown that Mr. Baird did not take any part in the meeting, but was present merely as a spectator

C. D. Marshall, of the McClintic-Marshall Construction Co., who appeared as a witness at the hearings in New York last summer, was recalled to the stand. He said that the Harriman lines had not solicited bids from his company for at least eight years. The Harriman lines, he said, include the Union Pacific, Southern Pacific, and other lines. He said that all Harriman line work is consistently awarded to the American Bridge Co.

In cross examination by Mr. Severance, Mr. Marshall admitted that his company had not taken any Harriman line work since 1901, when the Union and Southern Pacific roads were merged. He said that on one occasion, Mr. Thorne, director of purchases of the Union Pacific, inquired for bids from the McClintic-Marshall Construction Co., but that no business ever materialized to his company from this inquiry.

C. E. E. Childers, secretary of the Western Pennsylvania & Eastern Ohio Traffic Association until about two years ago, was called to the stand and asked what had become of the records and minutes of the meetings of that association. Mr. Childers said they were no longer in his charge as he had turned them over to G. P. Orr, assistant freight traffic manager of the Pennsylvania lines.

Willis L. King, vice president of the Jones & Laughlin Steel Co., was then recalled. Judge Dickinson wanted to know about a meeting of steel manufacturers held in New York in February, 1908, immediately preceding one of the Gary dinners. Mr. King said that to the best of his recollection this was a committee meeting. A number of others outside of the members of the committee, he said, might have been in attendance.

Judge Dickinson then read an extract from page 1028 of THE IRON TRADE REVIEW of Dec. 26, 1907, regarding a notice which described the work to be done by the various "Gary dinner" committees. The judge wanted to know if this announcement had been given out by the general committee after one of its meetings. This, said Mr. King, was not the case, as he did not remember any statement having been given out by the general committee.

The judge then wanted to know if Mr. King remembered which of the "Gary dinners" had been fully recorded in stenographic form. Here the counsel for the defense interrupted, declaring that it would place all stenographic records of the proceedings at the "Gary dinners" at the disposal of the government counsel.

CORPORATION OUTPUT

Shows Decrease in Finished Products Compared With Independents.

The American Iron and Steel Association has completed Part II of its annual statistical report for 1911. The report is one of the largest in number of pages issued during the past 40 years by the association, the two parts making a volume of 167 pages, if bound together. The statistics are unusually comprehensive, and those relating to the foreign trade will be of special value to manufacturers interested in commerce with foreign countries.

SUMMARY OF STATISTICS

Gross tons, except coke in net tons.	1910.	1911.
Sh'pm'ts., L. S. iron ore	43,442,397	32,793,130
Prod. of iron ore....	56,889,734	43,550,633
Imports of iron ore..	2,591,031	1,811,732
Exports of iron ore.	748,875	768,386
Prod., bitum. coal....	372,420,663	362,283,126
Prod., Pa. ant'rct....	75,433,246	80,771,488
Total prod., coal.....	447,853,909	443,054,614
Sh'p'mts., Pa. anth'ct	64,905,786	69,954,299
Ships., Cumb. coal...	7,148,968	6,202,748
Imports of coal.....	2,000,139	1,241,285
Dom. exp'ts., coal....	13,805,866	17,432,753
Shpts., Con'l's. coke.	18,689,722	16,334,174
Shpts., Poch'nt. coke.	2,335,932	1,323,387
Total prod., coke....	41,708,810	35,551,489
Total prod., pig iron	27,303,567	23,649,547
Prod., spiegel & ferro	224,431	184,718
Prod., Bess. steel....	9,412,772	7,947,854
Prod., O. H. steel...	16,504,509	15,598,650
Prod., crucible steel..	122,303	97,653
Prod., all other st'l..	55,335	31,949
Total prod., steel....	26,094,919	23,676,106
Prod., O. H. castgs..	863,351	571,191
Total prod., st'l cstgs.	940,832	646,627
Prod., Bess. rails...	1,884,442	1,053,420
Prod., O. H. rails...	1,751,359	1,676,923
Total prod., rails....	3,636,031	2,822,790
Prod., struct. shapes.	2,266,890	1,912,367
Prod., wire rods.....	2,241,830	2,450,453
Prod., pl'ts. & sht's..	4,955,484	4,488,049
Prod., blk. plates....	712,137	795,598
Prod., nail plate.....	45,294	48,522
Prod., tie plates.....	213,259	170,435
Prod., mer. bars....	3,785,731	3,047,362
Prod., concrete bars.	241,109	258,741
Prod., skelp, etc.....	1,828,194	1,980,673
Prod., hoops	262,214	225,074
Prod., cot. ties, etc..	424,979	342,810
Prod., splice bars.....	223,022	163,570
Prod., forging blms..	459,933	231,115
Prod., sheet piling...	26,598	22,827
Prod., railroad ties...	49,048	39,197
Prod., other forms..	1,174,922	1,005,621
Total prod., rolled..	21,621,279	19,039,171
Prod. of cut nails...	1,005,233	967,636
Prod. of wire nails..	12,704,902	13,437,778
Prod. of tinplates...	722,770	783,960
Prod. of char. blms..	75,974	64,616
Impts., iron and steel	$ 38,907,119	$ 28,995,600
Exp., iron and st'l..	$201,271,903	$249,656,411
Miles r. r. op. Dec. 31	243,107	246,573
Miles new r. r. built	3,918	3,293
Tong. st'l ves'ls blt..	299,460	163,805
Im'gr'ts landed, cal yr.	1,071,885	782,545

The tables showing the percentage of production of the United States Steel Corporation and the independents for 1910 and 1911 are of unusual interest at this time. The shipments of iron ore from the Lake Superior region by the Corporation were 54.3 per cent of the total, and the production of ore was 45.8 per cent of the total, as compared with 51.1 and 44.4 respectively in 1910. This increase may be attributed largely to the unusual efforts to move ore from the Hill properties. The production of coke in 1911 was 34.1 per cent of the whole, as compared with 32.7 per cent in 1910. Of the total of rolled products, the Corporation turned out 45.7 per cent in 1911, as compared with 48.1 per cent in 1910. The Corporation's pig iron production was 45.4 per cent in 1911 and 43.3 per cent in 1910. Of Bessemer, open-hearth, crucible, electric and all other steel ingots and castings, the Corporation produced 53.9 per cent in 1911 and 54.3 per cent in 1910. Of structural shapes, the Corporation produced 47 per cent in 1911 and 51.3 per cent in 1910. Of plates and sheets, the Corporation's output in 1911 was 45.7 per cent, as compared with 48 per cent in 1910. Of wire rods, the Corporation produced 64.7 per cent in 1911 and 67.3 per cent in 1910. The method of giving statistics on steel rails has been changed somewhat since 1910, when the Corporation was credited with making 60.2 per cent of the Bessemer steel rails, and 57.4 per cent of the open-hearth rails, while in 1911 all rails are included in one item including Bessemer, open-hearth, electric, rerolled, renewed, etc., and the Corporation's total is given as 56.1 per cent. Of tin plates and terne plates, the Corporation produced 61 per cent in 1910, and 60.7 per cent in 1911. Of wire nails, the Corporation produced 55.4 per cent in 1910, and 51.4 per cent in 1911.

NEARLY FIFTY MILLIONS

Will be the Total of Shipments From Superior Iron Ore Mines.

Ore shipments during October were 7,010,219 tons, making the total movement to Nov. 1, 43,348,601 tons. During the season of 1910 the fleet moved 42,620,201 tons, the record movement for a single season. This has now been broken with one month's navigation to spare. As the fleet moved 4,899,220 tons during November, 1909, it is pretty certain to move an equivalent or even greater amount during the present month, unless weather conditions should be unusual, so that the total movement of the present year will in all probability be in excess of 48,000,000 tons. In fact, it may be nearer 49,000,000 than 48,000,000. It is clear, therefore, that the long dreamed of movement of 50,000,000 tons in a year is about to be realized.

SHIPMENTS BY PORTS

Port	October, 1911.	October, 1912.
Escanaba	677,807	652,894
Marquette	387,436	514,753
Ashland	381,595	759,716
Superior	1,368 893	2,002,767
Duluth	956 342	1,686,324
Two Harbors	997,892	1,393,765
Total	4,769,965	7,010,219
1912 increase		2,240,254

Port.	To Nov. 1, 1911.	To Nov. 1, 1912.
Escanaba	3,764 654	4,663,879
Marquette	1,956 147	3,082,331
Ashland	2,260,381	4,382,877
Superior	9,315,002	13,100.043
Duluth	6,457,706	9,415 511
Two Harbors	5,853,212	8,703,960
Total	29,607,102	43,348,601
1912 increase		13,741,499

PRODUCTION OF LEADING IRON AND STEEL PRODUCTS

Articles.	1911—Gross tons. Iron.	Steel.	Total.	Total in 1910.
Rails	234	2,822,556	2,822,790	3,636,031
Structural shapes	811	1,911,556	1,912,367	2,266,890
Plates and sheets	89,427	4,398,622	4,488,049	4,955,484
Nail and spike plate	9,951	38,571	48,522	45,294
Wire rods	610	2,449,843	2,450,453	2,241,830
Rolled forging blooms and billets	363	230,752	231,115	459,933
Merchant bars	835,625	2,211,737	3,047,362	3,785,731
Bars for reinforced concrete work.	2,388	256,353	258,741	241,109
Skelp, flue, etc	322,397	1,658,276	1,980,673	1,828,194
Splice bars	14,694	148,876	163,570	223,022
Hoops	.....	225,074	225,074	262,214
Bands and cotton-ties	12	342,798	342,810	424,979
Sheet piling	.....	22,827	22,827	26,598
Railroad ties	.....	39,197	39,197	49,048
All other finished rolled products.	184,103	821,618	1,005,621	1,174,922
Total	1,460,615	17,578,556	19,039,171	21,621,279

PRODUCTION OF IRON AND STEEL MERCHANT BARS

States—Merchant bars.	1911—Gross tons. Active works.	Iron.	Steel.	Total.	Total in 1910.
Maine, Mass., and Conn.	6	19,783	12,200	31,983	44,882
New York	12	20,295	90,387	110,682	97,478
New Jersey	8	17,815	28,382	46,197	46,986
Pennsylvania	55	309,848	1,218,923	1,528,771	1,994,092
Maryland and Virginia	3	16,264	500	16,764	10,546
Ky., Tenn., N. C., Ga., and Texas	7	45,320	3,561	48,881	52,259
Alabama	3	3,550	25,041	28,591	31,389
Ohio	12	96,985	203,670	300,655	407,012
Indiana	8	175,903	158,252	334,155	291,728
Illinois	12	45,140	323,325	368,465	483,257
Michigan, Wis., and Mo.	5	50,833	111,886	162,719	252,468
Col., Wyo., Wash., Ore., and California	7	33,889	35,610	69,499	73,634
Total	138	835,625	2,211,737	3,047,362	3,785,731

PRODUCTION OF PLATES AND SHEETS

States—Gross tons.	1907.	1908.	1909.	1910.	1911.
New Eng., N. Y., & N. J.	126,403	58,567	119,642	141,999	106,298
Pennsylvania	2,651,166	1,531,066	2,384,185	2,808,883	2,405,247
Del., Md., and Virginia	28,420	25,000	29,038	23,863	22,060
West Virginia	153,599	159,714	211,012	225,649	246,893
Kentucky and Alabama	54,631	45,473	70,639	69,610	67,930
Ohio	851,987	603,213	938,185	1,052,414	1,168,879
Ind., Ill., Wis., Mo., Wyoming, and California	382,626	226,660	481,645	633,066	470,742
Total	4,248,832	2,649,693	4,234,346	4,955,484	4,488,049

Years—Gross tons.	Plates and sheets—Gross tons.		
	Iron.	Steel.	Total.
1905	72,156	3,460,074	3,532,230
1906	74,373	4,107,783	4,182,156
1907	74,038	4,174,794	4,248,832
1908	54,033	2,595,660	2,649,693
1909	76,202	4,158,144	4,234,346
1910	91,118	4,864,366	4,955,484
1911	89,427	4,398,622	4,488,049

Years. Gross tons.	Plates—No. 12 and thicker.			Sheets—No. 13 and thinner.		
	Iron.	Steel.	Total.	Iron.	Steel.	Total.
1905	10,022	2,031,184	2,041,206	62,134	1,428,890	1,491,024
1906	23,333	2,508,219	2,531,552	51,040	1,599,564	1,650,604
1907	30,277	2,629,783	2,660,060	43,761	1,545,011	1,588,772
1908	31,679	1,239,342	1,271,021	22,354	1,356,318	1,378,672
1909	32,332	2,346,766	2,379,098	43,870	1,811,378	1,855,248
1910	37,763	2,769,965	2,807,728	53,355	2,094,401	2,147,756
1911	46,147	2,288,194	2,334,341	43,280	2,110,428	2,153,708

PRODUCTION OF BLACK PLATES FOR TINNING

States—Gross tons.	1906.	1907.	1908.	1909.	1910.	1911.
Pennsylvania	312,977	253,807	278,163	308,982	427,530	483,576
Md. and West Va.	94,076	95,939	92,860	115,866	132,483	154,900
Ohio, Ind., and Ill.	169,026	154,326	142,748	181,634	152,124	157,122
Total	576,079	504,072	513,771	606,482	712,137	795,598

PRODUCTION OF TIN PLATES AND TERNE PLATES

States—Pounds.	Tinplates.	Terne plates.	Total.
Pennsylvania	1,008,267,000	70,695,000	1,078,962,000
New York and West Virginia	258,310,000	67,715,000	326,025,000
Ohio, Indiana, Illinois, and Michigan	331,052,000	20,031,000	351,083,000
Total for 1911	1,597,629,000	158,441,000	1,756,070,000
Total for 1910	1,450,821,000	168,184,000	1,619,005,000
Total for 1909	1,179,858,000	190,930,000	1,370,788,000
Total for 1908	1,048,896,000	154,179,000	1,203,075,000
Total for 1907	996,650,000	156,447,000	1,153,097,000
Total for 1906	1,100,373,000	193,367,000	1,293,740,000

PRODUCTION OF MISCELLANEOUS ROLLED PRODUCTS

Miscellaneous rolled products.	1911—Gross tons.			Total in 1910.
	Iron.	Steel.	Total.	
Merchant bars	835,625	2,211,737	3,047,362	3,785,731
Bars for reinforced concrete work	2,388	256,353	258,741	241,109
Skelp, flue, etc.	322,397	1,658,276	1,980,673	1,828,194
Splice bars	14,694	148,876	163,570	223,022
Hoops	.....	225,074	225,074	262,214
Bands and cotton-ties	12	342,798	342,810	424,979
Rolled forging blooms and billets	363	230,752	231,115	459,933
Sheet piling	.....	22,827	22,827	26,598
Railroad ties	.....	39,197	39,197	49,048
Spike and chain rods, bolt and nut rods, horseshoe bars, strips, etc.	184,103	821,518	1,005,621	1,174,922
Total	1,359,582	5,957,408	7,316,990	8,475,750

PRODUCTION OF IRON AND STEEL SKELP

States.	1906.	1907.	1908.	1909.	1910.	1911.
Pennsylvania	742,395	836,283	668,602	1,015,931	892,254	859,266
N. Y. and W. Va.	204,679	265,554	90,955	230,139	182,469	220,034
Ohio	508,325	634,945	390,554	787,311	753,471	895,353
Ind., Ill., Wis.	73,186	65,845	472	.....	.....	6,015
Total	1,528,585	1,802,627	1,150,583	2,033,381	1,828,194	1,980,673

PRODUCTION OF CUT AND WIRE NAILS

Years—Kegs of 100 pounds.	Cut nails. Kegs.	Wire nails. Kegs.	Total. Kegs.	Wire nails over cut.
1896	1,615,870	4,719,860	6,335,730	3,103,990
1897	2,106,799	8,997,245	11,104,044	6,890,446
1898	1,572,221	7,418,475	8,990,696	5,846,254
1899	1,904,340	7,618,130	9,522,470	5,713,790
1900	1,573,494	7,233,979	8,807,473	5,660,485
1901	1,542,240	9,803,822	11,346,062	8,261,582
1902	1,633,762	10,982,246	12,616,008	9,348,484
1903	1,435,893	9,631,661	11,067,554	8,195,768
1904	1,283,362	11,926,661	13,210,023	10,643,299
1905	1,357,549	10,854,892	12,212,441	9,497,343
1906	1,189,239	11,486,647	12,675,886	10,297,408
1907	1,109,138	11,731,044	12,840,182	10,621,906
1908	956,182	10,662,972	11,619,154	9,706,790
1909	1,207,597	13,916,053	15,123,650	12,708,456
1910	1,005,233	12,704,902	13,710,135	11,699,669
1911	967,636	13,437,778	14,405,414	12,470,142

WORLD'S PRODUCTION OF IRON AND STEEL IN 1910

Countries.	Pig iron.			Steel.		
	Years.	Production. Tons.	Per-centage.	Years.	Production. Tons.	Per-centage.
United States	1910	27,303,567	41.47	1910	26,094,919	43.16
Germany and Luxem.	1910	14,793,604	22.47	1910	13,698,638	22.66
Great Britain	1910	10,012,093	15.21	1910	†6,541,000	10.82
France	1910	4,038,297	6.13	1910	3,481,572	5.76
Belgium	1910	1,852,090	2.81	1910	1,944,820	3.22
Austria*	1910	1,558,719	2.37	1910	1,552,231	2.57
Hungary	1910	502,056	0.76	1910	636,140	1.05
Russia	1910	3,040,102	4.62	1910	3,592,024	5.94
Sweden	1910	603,939	0.92	1910	472,461	0.78
Spain	1910	373,322	0.57	1910	316,301	0.52
Italy	1910	353,239	0.54	1910	732,000	1.21
Canada	1910	740,210	1.12	1910	741,924	1.23
Other countries	1910	663,757	1.01	1910	653,970	1.08
Total	.....	65,835,000	100.00	.....	60,458,000	100.00

WORLD'S PRODUCTION OF IRON ORE AND COAL

Countries.	Iron ore.			Coal and lignite.		
	Years.	Production. Tons.	Per-centage.	Years.	Production. Tons.	Per-centage.
United States	1910	56,889,734	38.66	1910	447,853,909	38.78
Germany and Luxem.	1910	28,709,700	19.51	1910	222,375,076	19.25
Great Britain	1910	*15,228,577	10.35	1910	264,433,028	22.90
France	1910	14,605,542	9.93	1910	38,349,942	3.32
Algeria	1910	1,064,909	0.72	.....	.....	.....
Belgium	1910	123,560	0.08	1910	23,916,560	2.07
Austria †	1910	2,760,304	1.88	1910	39,613,499	3.43
Hungary	1910	1,905,749	1.30	1910	9,036,269	0.78
Russia	1910	5,637,635	3.83	1910	24,734,247	2.14
Sweden	1910	5,552,678	3.77	1910	302,786	0.02
Spain	1910	8,666,795	5.89	1910	4,057,532	0.35
Italy	1910	551,259	0.38	1910	562,153	0.05
Canada	1910	‡231,623	0.16	1910	11,526,029	1.00
Newfoundland	1910	1,108,762	0.75	.....	.....	.....
Cuba	1910	‡1,429,349	0.97	.....	.....	.....
Transvaal	.....	.....	.....	1910	3,544,704	0.31
Natal	.....	.....	.....	1910	2,204,746	0.20
India	1910	54,626	0.04	1910	12,047,413	1.04
Greece	1910	608,000	0.41	1909	3,873	0.00
New South Wales	1910	72,825	0.05	1910	8,173,506	0.71
New Zealand	.....	.....	.....	1910	2,197,362	0.19
Other Australasia	1910	99,530	0.07	1910	1,584,846	0.14
Japan	1910	§254,188	0.17	1910	15,681,324	1.36
Other countries	1910	1,591,655	1.08	1910	22,611,194	1.96
Total	.....	147,147,000	100.00	.....	1,154,900,000	100.00

LATEST MACHINERY NEWS COLLECTED IN LEADING MANUFACTURING CENTERS

In New York, the last seven days of October proved to be one of the best weeks of the month. A large aggregate of orders was booked, and in addition to a good volume of general domestic inquiry, two fair-sized individual lists of machine shop equipment for export, were received by the dealers. The National Transcontinental Railway Co. of Canada is asking bids on about 35 machine tools, and the Eastern Car Co., New Glasgow, N. S., has a list out including shears, punches, bulldozers, upsetters, presses, lathes, grinders, drills, cranes and hammers. The Morrow Mfg. Co., Elmira, N. Y., placed orders for machine tools, amounting to approximately $75,000; the Canadian Pacific railroad closed for a number of machines and the New York, New Haven & Hartford railroad completed its buying for the Van Ness shop, now under construction at the Van Ness yards. Some important sales have been made by representatives of electric crane builders for domestic manufacturing plants, and inquiries for this line of apparatus have expanded materially of late. It is becoming conspicuously difficult to meet the demand for normal delivery of all classes of machinery, due to the inability to secure semi-finished material, except by paying a premium on warehouse stock.

In Pittsburgh, the most important buyer of machine tools recently, was the Union Switch & Signal Co., Swissvale, Pa., which purchased six radial drills, two lathes, five milling machines, two steam drop hammers and some other machinery. A number of other buyers came into the market for one or two tools each. Several dealers are figuring on the requirements of the Keystone Driller Co., Beaver Falls, Pa. The month of October was a good one for most dealers in that section. One dealer reports that in each of the past three months, he has booked on an average of five times as much business as in any of the other months this year. At present, there is a slight lull in the market, probably due to the coming election.

In Cleveland, the machine tool business is following the same general lines that have been prevalent during the past three months. The amount of business as a whole is heavy, but is confined almost entirely to small lots. One dealer, however, closed a good-sized order for about 15 tools this week. The trade showed no effects last week of the lull in business during the preceding one, and the aggregate of business was large. October, as a whole, was a satisfactory month to machine tool dealers in that district. Deliveries are beginning to fall behind and on certain special lines of machines, the second quarter of next year is the earliest delivery promised. In some other lines, however, deliveries can be made in two weeks.

In Cincinnati, the machinery market, judging from the majority of reports, has not been as good during the past week as in the week previous. The outlook for the month of November is not promising. It is hardly probable that the amount of business transacted during this month will exceed, or even equal, that during October, which was not as good as the two months preceding. Lathes have ceased to be the best sellers of the machine tools, and radial drills seem to be more in demand at the present time. One reason given for the somewhat sudden dropping off of orders, is the coming election, which machinery builders are watching with much interest, owing to the tariff question that was contested in Washington, D. C., last spring. Electrical equipment, while still selling as well as anything in the machinery line, has dropped considerably within the past two weeks. Little business is being done in second-hand machinery. Better conditions are not looked for to any extent before the first of next year.

Machine Tools

The National Transcontinental Railway Co. of Canada, has distributed a list of machine shop equipment approximating $40,000 in value, among New York dealers. The specifications call for complete standard equipment and motors. Included are the following units:

One 80-inch motor-driven wheel lathe.
One 30-inch by 8-foot, motor-driven planer.
One 4-foot motor-driven radial drill.
One 28-inch by 16-foot motor-driven gap lathe.
One 20-inch by 10-foot motor-driven double back geared engine lathe.
One 16-inch by 8-foot motor-driven high speed double back geared engine lathe.
One 20-inch motor driven drill press.
One 16-inch motor driven shaper.
One 4-inch motor driven pipe machine.
One 2-inch motor-driven bolt cutter.
One 500-pound motor-driven power hammer.
One 36-inch motor-driven grindstone.
One 30-inch motor-driven band saw.
One 24-inch pony planer.
One 14-inch portable bolt lathe.
Two forge blowers.
Three portable cranes.
Two 400-pound anvils.

Another large machinery list, calling for about 40 different machines, has just made its appearance in the New York market, the prospective buyer being the Eastern Car Co., Ltd., New Glasgow, N. S. All the machines are for early delivery and are to be arranged for motor drive, but the motors are not to be included in the bids. Prices are to be made f. o. b. New Glasgow. The complete list is as follows:

Two 125-inch gate shears, 24-inch throat.
One 62-inch gate shear, 24-inch throat.
One double angle shear, 6 x 6 x ¾ inches mounted on turntable.
Two multiple punches, 120 inches wide.
One multiple punch, 125 inches wide and 18-inch throat.
One mill plate punch, 12 feet between housings.
Three open gap punches, 24-inch throat, 1¼ inches through 1 inch.
Two open gap punches, 24-inch throat.
Two horizontal punches; gap 10 feet deep.
Two horizontal punches with four gagged punches adjusted horizontally, two inches either side of center.
One No. 9 bulldozer, 24-inch stroke.
One No. 20 bulldozer, 20-inch stroke.
One No. 23 bulldozer, 16-inch stroke.
One 2-inch upsetter.
One 1½-inch upsetter.
One bar shear, 2 x 12 inches.
One bar shear, for 2-inch rounds.
Two Bradley hammers.
One hydraulic wheel press, steel pressure 200 tons, for 33-inch wheel.
Five axle lathes, with or without cranes.
Two heavy wheel boring mills, with cranes.
One tool grinder.
Two spindle arch bar drills.
One 2 000-pound steam hammer.
One 400-pound steam hammer.

The Jackson Ornamental Iron & Bronze Works, Jackson, Tenn., advises that it is installing a new foundry. Cupola equipment has been pur-

chased, but the company will require a hand traveling crane, 28 feet 4 inches span, and also a power hack saw 12 to 15-inch capacity swivel table.

The Winston Sheet Metal Co., Winston-Salem, N. C., advises that it has purchased most of its new equipment, but is in the market for two large cornice breaks, a burring machine, tinners' shears, etc.

Water Works

Marion, Ky., will probably issue bonds for the purpose of constructing a water-works system. The amount provided for the purpose is $25,000.

Versailles, Ky., is contemplating improvements in its water - works plant, and funds will be secured by the issue of bonds to the amount of $25,000.

The Winnipeg, Man., board of control is asking for tenders up till Nov. 15 in connection with the Artesian Well Water Supply System, including supply and erection of deep well turbine pumps and meters; supply and installation of voltage transformers at pumping stations; supply and erection of material for power line, and supply and laying of approximately 61,000 feet of steel pipe line with valves and specials.

New Construction

The Malleable Foundry Co., Benton Harbor, Mich., has nearly completed a new building, 60 x 145 feet, with a wing, 60 x 80 feet.

The Sectional Threshing Cylinder Co. is considering the doubling of the capacity of its plant at Dishman, Wash.

The James Clark Jr. Electric Co., Louisville, Ky., is adding to its storage facilities by the erection of two corrugated iron warehouses, 50 x 100 feet.

The Franklin Moore Co., Winsted, Conn., manufacturer of carriage bolts, is preparing to build a new erecting shop, to be of brick and steel, one story high, 40 x 90 feet.

J. Rikeach & Sons, Inc., 409 Himes street, Brooklyn, N. Y., have plans for the construction of a four-story factory, 60 x 100 feet. The building is estimated to cost $30,000.

W. H. Fox is having a building put up at the corner of Onida and Basalt streets, Idaho Falls, Id., 40 x 64 feet, for a machine shop and foundry. The structure will be of brick and corrugated iron.

The Arcade Malleable Iron Co., Worcester, Mass., has erected a new storage shed 20 x 60 feet, two stories, of steel and concrete construction. Some other small additions to the plant have also been made.

The Sharon Steel Products Co., a subsidiary of the Petroleum Iron Works, Sharon, Pa., is erecting a plant on the latter company's site at Sharon. Steel barrels will be manufactured.

The Quality Saw & Tool Works and the Napier Saw Machine Works, Springfield, Mass., have completed their new factory in Napier street. The building is of brick construction, 50 x 215 feet, and two stories high, with an ell, 50 x 50 feet.

The Virginia Bridge & Iron Co. has been awarded the contract for the construction of the main building of the Lynchburg Pipe & Foundry Co., at Anniston, Ala., and will also have charge of the structural steel work for the cranes.

The Standard Sanitary Mfg. Co., Pittsburgh, is building a 70 x 75-foot addition to its enameling plant, at Woods Run, Pa., which will give the company two additional furnaces. The new building is one story and will be completed before the end of the year.

The Standard Nut & Bolt Co., Valley Falls, R. I., has begun the erection of a one-story frame addition covering about 7,000 square feet of space, to its plant in Abbott street. The new structure will double the plant's capacity.

The Griffin Wheel Co., Chelsea, Mass., is to add three new buildings to the present plant, the completion of which will enable the company to increase its production to 500 car wheels daily. The size and type of the new buildings have not been determined, but plans are under consideration and will be passed upon soon.

Ground was broken recently for another large addition to the enameling and stamping works of the Jacob J. Vollrath Mfg. Co. at Sheboygan, Wis. The new structure will be 200 x 400 feet and will be devoted to stamping work. The company has occupied its present plant only a little more than a year.

The Baltimore Malleable Iron & Steel Casting Co., Baltimore, Md., is preparing to erect a one-story brick addition to its foundry, at the southeast corner of Charles and Wells streets. The addition is to be 52 x 87 feet, estimated to cost about $3,500. Edward Brady & Son have made the plans and will put up the structure.

The Eclipse Machine Co., Elmira, N. Y., advises that its building operations cover an addition, to be 60 x 125 feet, to its factory. The addition will be occupied principally as a store room, but will enable the company to add nine automatic machines which have been purchased. All equipment, supplies, etc., for the new building have been ordered.

In THE IRON TRADE REVIEW of Oct. 31, an error was made in the dimensions of the new buildings being erected for the Wm. Graver Tank Works, East Chicago, Ind. The main building is 66 x 188 feet, instead of 66 x 100 feet. The storage building is 30 x 60 feet, instead of 30 x 30 feet, as given. There will also be two electric traveling cranes and runways instead of one.

The Blaw Steel Construction Co., Pittsburgh, is erecting a new plant at Hoboken, Pa., two miles beyond Aspinwall, in the Pittsburgh district. It will be put in operation about Jan. 1, 1913, and will have a monthly capacity of 2,500 tons of structural steel, galvanized transmission towers and steel concrete forms. The company will move the equipment from its plant at Reynoldsville, Pa., to the new location.

Power Plant Equipment

Corydon, Ky., has completed plans for voting on a bond issue of $10,000, the proceeds of which will be used in the construction of an electric light plant.

Campbellsburg, Ind., which is installing an electric light plant, and has purchased an engine and generator, is in the market for the remaining equipment. Plans and specifications are at rooms 414-416, No. 5 Beekman street, New York.

New Buyers

(In order to assist the post office in delivering letters to new concerns, it is suggested that the names of incorporators be written in the lower left hand part of every envelope addressed to such new companies.)

The following manufacturing companies have filed articles of incorporation:

Standard Metal Selling Co., Ltd., Toronto; capital, $40,000; provisional directors, James C. Noice, Ephraim R. Sugarman and Nancy E. Wunsch.

Agnew Electric Welder Co., Ltd., Walkerville, Ont.; capital, $40,000; to manufacture electric welding machinery; provisional directors, Ray F. Agnew, Charles Fleming, Harry Crouchman and others.

Allino Switch Box Mfg. Co., St. Louis; $6,000; to manufacture, buy and deal in electrical appliances, switch boxes, tools, dies and electrical machinery; by J. F. Brinkmeyer, C. C. Maison, W. F. Peters.

The Northey-Simmen Signal Co., Ltd., Toronto; capital, $5,200,000; to manufacture appliances, equipment,

etc., in connection with signalling, protection or better operation in railways or navigation; provisional directors, John P. Northey, Thomas A. Plummer, Thomas P. Wadsworth and others.

General Industrial

The Hoopeston Malleable Iron Works, Hoopeston, Ill., will resume within a month, according to reports.

The West Michigan Steel Foundry Co., Muskegon, Mich., has been incorporated with a capital stock of $15,000.

The F. W. Pownall Iron Works, Jamesburg, N. J., has been incorporated with a capital stock of $25,000. Incorporators, Frank H. Pownall, F. L. Buckelew and Joseph M. Perrine.

The contract for constructing a concrete and steel bridge over Fish Creek near Ashland, Wis., was awarded to Frank Johnson, of Washburn, Wis., at $3,000.

N. & G. Taylor Co., manufacturer of tin plate, Philadelphia, advises that it has no plans made for increasing the capacity of its Cumberland, Md., plant.

The American Machine & Foundry Co., Brooklyn, N. Y., advises that it will be unable to give out any information concerning its new factory for several months.

The Transfer Produce Co., Jersey City, N. J., has been incorporated with a capital stock of $50,000, by B. S. Smith, L. H. Gunther, and H. A. Black. It will manufacture typewriters.

The Reed-Prentice Co., Worcester, Mass., has bought a 12,000-foot tract of land adjoining its plant at Gold and Hermon streets, and will use it for the future development of its plant.

The Hewitt Machine Co., Neenah, Wis., announces that the partnership between J. W. Hewitt and C. I. Sprague has been dissolved and the business will be continued alone by Mr. Hewitt. The firm operates a machine shop.

The manufacture of plows and other agricultural implements is contemplated by the Lynchburg Foundry Co., Lynchburg, Va., which will change its equipment gradually so as to convert its pipe works into a foundry of the special kind indicated.

The Van Norman Machine Tool Co., Springfield, Mass., advises that it is making some re-arrangements of its present plant, which will give it some additional working room to meet its expanding manufacturing requirements. It is not planned, however, to erect any new buildings at the present time.

The Buss Machinery Co., which recently removed its establishment from Muskegon, Mich., has opened a new machine shop and iron working factory in Pentwater, Mich. The company has been reorganized, with a capital stock of $25,000. It will manufacture wood working machinery.

The New Britain Machine Co., New Britain, Conn., advises that its capital stock has been increased from $450,000 to $600,000. The building construction now under way is all that is contemplated for the present and all the equipment for this has been arranged for.

The Albion Malleable Iron Co., Albion, Mich., advises that the damage incurred by the recent fire in its works was slight, amounting to about $1,200 or $1,500. The fire was confined to an old wooden building which had been used for a storehouse of odds and ends, and which will not be replaced.

The Palmetto Machine Co., Inc., Tampa, Fla., advises that no definite plans have yet been made for the enlargement of the plant which it recently purchased. It is, however, in the market for steel castings, gears and sprockets of various specifications, to be used in the construction of its grubbing machines.

The plant of the Pennsylvania & West Virginia Steel Co. at Lebanon, Pa., has been sold at public auction at the instance of the Fidelity Trust Co., holder of a mortgage given in security of a bond issue. The plant was purchased for the sum of $47,000 by R. G. Cox, of Harrisburg, representing the bondholders.

The Economy Water Heater Co., Inc., St. Louis, Mo., recently incorporated in Missouri with a capital stock of $50,000, advises that it will engage in the manufacture and selling of the "Economy water heater", under the Ellebrecht patent. At present the intention is to have the heaters made by contract, although it is probable that a plant will be built later.

All the machinery and equipment that will be required by the Southern Art Metal Co., Americus, Ga., in its new plant in that city has been purchased. This company was recently incorporated with a capital stock of $35,000. It will engage in the manufacture of metal roofing, metal shingles and other sheet steel and tin builder's supplies.

The Mauch Chunk Iron Works, Mauch Chunk, Pa., which was recently incorporated, advises that at the present time it has not decided upon plans for additions to its plant. The company is manufacturing all kinds of mining and quarrying machinery and a general line of gray iron and brass castings at its present plant at Mauch Chunk, Pa. E. T. James is president of the company.

The Sterling Machinery Co., La Crosse, Wis., has been incorporated by citizens of La Crosse, with a capital stock of $25,000. Brick-making machines will be manufactured. Plans for a new building have been drawn and it is expected that by the first of the year enough new equipment will have been added to take care of orders.

The Joseph L. Skeldon Engineering Co., Toledo, O., advises that its recent incorporation was merely the taking over of the business of Joseph L. Skeldon under its present name. The company sells boilers, engines, pumps, complete power plant equipment, or installs general contracts including water works and light plants. There will be no building done or equipment required at present.

Construction work has so far advanced on the six-mill sheet plant which the Apollo Steel Co., Apollo, Pa., is building in that town, that actual operations in the plant will probably start soon after the first of the year. The company is erecting, in addition to the six mills, a galvanizing department, which will be equipped with two galvanizing pots. The plant will run exclusively on black and galvanized steel sheets.

Trade Notes

The Youngstown Sheet & Tube Co., Youngstown, O., advises that its Chicago offices were removed on Oct. 29 from the Marquette building to 1563 McCormick building, 322 South Michigan avenue.

The J. L. Rubin Iron Co., Chicago, advises that it is succeeding the Rockford Iron & Steel Co., Rockford, Ill. It also states that the offices will be maintained in Chicago. J. L. Rubin, formerly secretary and treasurer of the Rockford Iron & Steel Co., will take full charge of the concern.

Fires

Fire at the pattern storage room of the Ohio Foundry Co., Cleveland, on Oct. 30, caused damage estimated at $300.

Fire in the foundry of the United States Scale Co., Terre Haute, Ind., has caused damage that will amount to $10,000. The roof was destroyed and the interior and much of the machinery were badly damaged. The company expects to start rebuilding the foundry at once.